



**National Aeronautics and
Space Administration
Langley Research Center**

**Scientific and Technical
Information Program Office**

Scientific and Technical Aerospace Reports

STAIR

WHAT'S INSIDE

- **NASA STI Program Overview**
- **Introduction**
- **NASA STI Availability Information**
- **Table of Contents**
- **Subject Term Index**
- **Personal Author Index**

NASA STI Program ... in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA scientific and technical information (STI) program plays a key part in helping NASA maintain this important role.

The NASA STI program operates under the auspices of the Agency Chief Information Officer. It collects, organizes, provides for archiving, and disseminates NASA's STI. The NASA STI program provides access to the NASA Aeronautics and Space Database and its public interface, the NASA Technical Report Server, thus providing one of the largest collections of aeronautical and space science STI in the world. Results are published in both non-NASA channels and by NASA in the NASA STI Report Series, which includes the following report types:

- **TECHNICAL PUBLICATION.** Reports of completed research or a major significant phase of research that present the results of NASA Programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.
- **TECHNICAL MEMORANDUM.** Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.
- **CONTRACTOR REPORT.** Scientific and technical findings by NASA-sponsored contractors and grantees.

- **CONFERENCE PUBLICATION.** Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or co-sponsored by NASA.
- **SPECIAL PUBLICATION.** Scientific, technical, or historical information from NASA programs, projects, and missions, often concerned with subjects having substantial public interest.
- **TECHNICAL TRANSLATION.** English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services also include creating custom thesauri, building customized databases, and organizing and publishing research results.

For more information about the NASA STI program, see the following:

- Access the NASA STI program home page at <http://www.sti.nasa.gov>
- E-mail your question via the Internet to help@sti.nasa.gov
- Fax your question to the NASA STI Help Desk at (301) 621-0134
- Phone the NASA STI Help Desk at (301) 621-0390
- Write to:
NASA STI Help Desk
NASA Center for AeroSpace Information
7115 Standard Drive
Hanover, MD 21076-1320

Introduction

Scientific and Technical Aerospace Reports (STAR) is an online information resource listing citations and abstracts of NASA and worldwide aerospace-related scientific and technical information (STI). Updated biweekly, *STAR* highlights the most recent additions to the NASA Aeronautics and Space Database. Through this resource, the NASA STI Program provides timely access to the most current aerospace-related research and development (R&D) results.

STAR subject coverage includes all aspects of aeronautics and space research and development, supporting basic and applied research, and application, as well as aerospace aspects of Earth resources, energy development, conservation, oceanography, environmental protection, urban transportation and other topics of high national priority. The listing is arranged first by 11 broad subject divisions, then within these divisions by 76 subject categories and includes two indexes: subject and author.

STAR includes citations to R&D results reported in:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institution, universities, and private firms
- Translations
- NASA-owned patents and patent applications
- Other U.S. Government agency and foreign patents and patent applications
- Domestic and foreign dissertations and theses

The NASA STI Program

The NASA STI Program was established to support the objectives of NASA's missions and research to advance aeronautics and space science. By sharing information, the NASA STI Program ensures that the U.S. maintains its preeminence in aerospace-related industries and education, minimizes duplication of research, and increases research productivity.

Through the NASA Center for AeroSpace Information (CASI), the NASA STI Program acquires, processes, archives, announces, and disseminates both NASA's internal STI and worldwide STI. The results of 20th and 21st century aeronautics and aerospace research and development, a worldwide investment totaling billions of dollars, have been captured, organized, and stored in the NASA Aeronautics and Space Database. New information is continually announced and made available as it is acquired, making this a dynamic and historical collection of value to business, industry, academia, federal institutions, and the general public.

The STI Program offers products and tools that allow efficient access to the wealth of information derived from global R&D efforts. In addition, customized services are available to help tailor this valuable resource to meet your specific needs.

For more information on the most up-to-date NASA STI, visit the STI Program's Web site at <http://www.sti.nasa.gov>.

NASA STI Availability Information

NASA Center for AeroSpace Information (CASI)

Through NASA CASI, the NASA STI Program offers many information products and services to the aerospace community and to the public, including access to a selection of full text of the NASA STI. Free registration with the program is available to NASA, U.S. Government agencies and contractors. To register, contact CASI at help@sti.nasa.gov. Others should visit the program at www.sti.nasa.gov. The 'search selected databases' button provides access to the NASA Technical Reports Server (NTRS) – the publicly available contents of the NASA Aeronautics and Space Database.

Each citation in *STAR* indicates a 'Source of Availability.' When CASI is indicated, the user can order this information directly from CASI using the [STI Online Order Form](#), e-mail to help@sti.nasa.gov, or telephone the STI Help Desk at 301-621-0390. Before ordering you may access [price code tables](#) for STI documents and videos. When information is not available from CASI, the source of the information is indicated when known.

NASA STI is also available to the public through Federal information organizations. NASA CASI disseminates publicly available NASA STI to the National Technical Information Service (NTIS) and to the Federal Depository Library Program (FDLP) through the Government Printing Office (GPO). In addition, NASA patents are available online from the U.S. Patent and Trademark Office.

National Technical Information Service (NTIS)

The National Technical Information Service serves the American public as a central resource for unlimited, unclassified U.S. Government scientific, technical, engineering, and business related information. For more than 50 years NTIS has provided businesses, universities, and the public timely access to well over 2 million publications covering over 350 subject areas. Visit NTIS at <http://www.ntis.gov>.

The Federal Depository Library Program (FDLP)

The U.S. Congress established the **Federal Depository Library Program** to ensure access for the American public to U.S. Government information. The program acquires and disseminates information products from all three branches of the U.S. Government to nearly 1,300 Federal depository libraries nationwide. The libraries maintain these information products as part of their existing collections and are responsible for assuring that the public has free access to the information. Locate the Federal depository libraries at <http://www.gpoaccess.gov/index.html>.

The U.S. Patent and Trademark Office (USPTO)

The U.S. Patent and Trademark Office provides online access to full text patents and patent applications. The database includes patents back to 1976 plus some pre-1975 patents. Visit the USPTO at <http://www.uspto.gov/patft/>.

Table of Contents

Subject Divisions/Categories

Document citations are grouped by division and then by category, according to the *NASA Scope and Subject Category Guide*.

Aeronautics

01	Aeronautics (General)	1
02	Aerodynamics	2
03	Air Transportation and Safety	4
04	Aircraft Communications and Navigation	11
05	Aircraft Design, Testing and Performance	13
06	Avionics and Aircraft Instrumentation	20
07	Aircraft Propulsion and Power	20
08	Aircraft Stability and Control	21
09	Research and Support Facilities (Air)	22

Astronautics

12	Astronautics (General)	23
15	Launch Vehicles and Launch Operations	25
16	Space Transportation and Safety	30
17	Space Communications, Spacecraft Communications, Command and Tracking	31
18	Spacecraft Design, Testing and Performance	31
19	Spacecraft Instrumentation and Astrionics	34
20	Spacecraft Propulsion and Power	35

Chemistry and Materials

23	Chemistry and Materials (General)	37
24	Composite Materials	47
25	Inorganic, Organic and Physical Chemistry	51
26	Metals and Metallic Materials	60
27	Nonmetallic Materials	66
28	Propellants and Fuels	70
29	Space Processing	72

Engineering

31	Engineering (General)	73
32	Communications and Radar	76
33	Electronics and Electrical Engineering	93
34	Fluid Mechanics and Thermodynamics	112
35	Instrumentation and Photography	118
36	Lasers and Masers	122

37	Mechanical Engineering	125
38	Quality Assurance and Reliability	128
39	Structural Mechanics	129

Geosciences

42	Geosciences (General)	131
43	Earth Resources and Remote Sensing	133
44	Energy Production and Conversion	138
45	Environment Pollution	140
46	Geophysics	149
47	Meteorology and Climatology	152
48	Oceanography	159

Life Sciences

51	Life Sciences (General)	159
52	Aerospace Medicine	196
53	Behavioral Sciences	205
54	Man/System Technology and Life Support	206

Mathematical and Computer Sciences

59	Mathematical and Computer Sciences (General)	211
60	Computer Operations and Hardware	215
61	Computer Programming and Software	216
62	Computer Systems	233
63	Cybernetics, Artificial Intelligence and Robotics	244
64	Numerical Analysis	249
65	Statistics and Probability	254
66	Systems Analysis and Operations Research	256
67	Theoretical Mathematics	263

Physics

70	Physics (General)	264
71	Acoustics	278
72	Atomic and Molecular Physics	279
73	Nuclear Physics	281
74	Optics	282
75	Plasma Physics	287
76	Solid-State Physics	289
77	Physics of Elementary Particles and Fields	291

Social and Information Sciences

81	Administration and Management	292
82	Documentation and Information Science	292

Space Sciences

88	Space Sciences (General)	309
89	Astronomy	313
90	Astrophysics	317
91	Lunar and Planetary Science and Exploration	320
92	Solar Physics	326
93	Space Radiation	327

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also select either of the two indexes provided for linking to the corresponding document citation from *NASA Thesaurus* terms and personal author names.

[Subject Term Index](#)

[Personal Author Index](#)

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 45, NUMBER 7

APRIL 16, 2007

01 AERONAUTICS (GENERAL)

Includes general research topics related to manned and unmanned aircraft and the problems of flight within the Earth's atmosphere. Also includes manufacturing, maintenance, and repair of aircraft. For specific topics in aeronautics, see categories 02 through 09. For information related to space vehicles see 12 Astronautics.

20070011488 NASA Langley Research Center, Hampton, VA, USA, National Inst. of Aerospace, Hampton, VA, USA
Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region

Shin, Jong-Yeob; February 2007; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NCC1-02043; WBS 23-079-30-12

Report No.(s): NASA/CR-2007-213926; NIA Report No. 2005-08; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011488>

For applying linear parameter varying (LPV) control synthesis and analysis to a nonlinear system, it is required that a nonlinear system be represented in the form of an LPV model. In this paper, a new representation method is developed to construct an LPV model from a nonlinear mathematical model without the restriction that an operating point must be in the neighborhood of equilibrium points. An LPV model constructed by the new method preserves local stabilities of the original nonlinear system at 'frozen' scheduling parameters and also represents the original nonlinear dynamics of a system over a non-trim region. An LPV model of the motion of FASER (Free-flying Aircraft for Subscale Experimental Research) is constructed by the new method.

Author

Linear Parameter-Varying Control; Stability; Nonlinear Systems; Aircraft Models

20070011546 Missouri Univ., Rolla, MO, USA

Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course

Myers, J. J.; Hrynyk, T.; Ayoub, A.; Belarbi, A.; Schonberg, W.; Jan. 2007; 14 pp.; In English

Report No.(s): PB2007-103388; UTC ETT-160; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A new teaching laboratory was developed for the junior course in CE-ArchE 217 Structural Analysis I. The primary objective of the laboratory was to give students hands-on experiences and build their understanding of structural analysis and their application to civil and architectural engineering structures including transportation structures such as bridges. The experiments were designed to foster creative thinking and to make the study of structural analysis more meaningful by incorporating the concept of design, model, test, observe, and discuss. Specific educational objectives of the hands-on experiments were: Acquaint the students with basic experimental techniques, computer modeling, equipment, and methods used in the analysis of structures; Provide the students with opportunities to make experimental observations and relate them to theory and computer models, and further discuss the results, draw conclusion and communicate the findings in writing, as well as orally; Introduce the student to experimental research and laboratory modeling of experiments.

NTIS

Education; Structural Analysis

20070013555 Conte (Francis L.), Swampscott, MA, USA

Thermal Shield Turbine Airfoil

Lee, C. P.; Bunker, R. S.; 15 Apr 04; 8 pp.; In English

Contract(s)/Grant(s): AF-F33615-02-C-2212

Patent Info.: Filed Filed 15 Apr 04; US-Patent-Appl-SN-10-824-922

Report No.(s): PB2007-105964; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A turbine airfoil includes opposite pressure and suction sides joined together at leading and trailing edges. An outwardly

convex nose bridge bridges the pressure and suction sides behind the leading edge, and is integrally joined to a complementary thermally insulating shield spaced therefrom to define a bridge channel. The shield includes the leading edge and wraps laterally aft around the nose bridge along both the pressure and suction sides.

NTIS

Airfoils; Heat Shielding; Turbines

02 AERODYNAMICS

Includes aerodynamics of flight vehicles, test bodies, airframe components and combinations, wings, and control surfaces. Also includes aerodynamics of rotors, stators, fans, and other elements of turbomachinery. For related information see also 34 Fluid Mechanics and Thermodynamics.

20070012357 NASA Marshall Space Flight Center, Huntsville, AL, USA

Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow

Saeks, R.; Popovic, S.; Chow, A. S.; August 2006; 96 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS8-00137; N00178-01-C-1039

Report No.(s): NASA/TP-2006-214602; M-1171; Copyright; Avail.: CASI: [A05](#), Hardcopy

The structure of a shock wave propagating through a weakly ionized gas is analyzed using an electrofluid dynamics model composed of classical conservation laws and Gauss Law. A viscosity model is included to correctly model the spatial scale of the shock structure, and quasi-neutrality is not assumed. A detailed analysis of the structure of a shock wave propagating in a weakly ionized gas is presented, together with a discussion of the physics underlying the key features of the shock structure. A model for the flow behind a shock wave propagating through a weakly ionized gas is developed and used to analyze the effect of the ionization on the aerodynamics and performance of a two-dimensional hypersonic lifting body.

Author

Shock Waves; Gas Flow; Aerodynamics; Ionized Gases; Lifting Bodies

20070012367 NASA Johnson Space Center, Houston, TX, USA

The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective

James, George H., III; Carne, Thomas G.; May 02, 2007; 1 pp.; In English; International Operational Modal Analysis Conference, 30 Apr. - 2 May 2007, Copenhagen, Denmark; Copyright; Avail.: Other Sources; Abstract Only

Wind turbines are very large, flexible structures, with aerodynamic forces on the rotating blades producing periodic forces with frequencies at the harmonics of the rotation frequency. Due to design consideration, these rotational frequencies are comparable to the modal frequencies; thus avoiding resonant conditions is a critical consideration. Consequently, predicting and experimentally validating the modal frequencies of wind turbines has been important to their successful design and operation. Performing modal tests on flexible structures over 120 meters tall is a substantial challenge, which has inspired innovative developments in modal test technology. A further trial to the analyst and experimentalist is that the modal frequencies are dependent on the turbine rotation speed, so testing a parked turbine does not fully validate the analytical predictions. The history and development of this modal testing technology will be reviewed, showing historical tests and techniques, ranging from two-meter to 100-meter turbines for both parked and rotating tests. The NEXt (Natural Excitation Technique) was developed in the 1990's, as a predecessor to OMA to overcome these challenges. We will trace the difficulties and successes of wind turbine modal testing over the past twenty-five years from 1982 to the present.

Author

Wind Turbines; Prediction Analysis Techniques; Aerodynamic Forces; Harmonics; Excitation

20070012800 Naval Postgraduate School, Monterey, CA USA

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle

Lim, Seng C; Dec 2006; 109 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462653; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462653>

The low Reynolds number aerodynamics of the flapping-wing Micro-Air Vehicle (MAV) developed at NPS by Max Platzer and Kevin Jones was studied numerically. The dynamic mesh simulation model of the full multi-wing configuration, which consists of a fixed wing and a pair of aft position, opposed pitch/plunge flapping wings was developed using an advanced CFD code that is available commercially. The unsteady Navier-Stokes flow fields, wake structures and forces

variations were determined and compared with reference to past experimental observations. The results were encouraging and provided impetus for future computational optimization studies on the NPS flapping wing MAV.

DTIC

Computational Fluid Dynamics; Drone Vehicles; Flapping; Microminiaturization; Propulsion; Propulsion System Configurations; Propulsion System Performance; Wings

20070012804 Naval Postgraduate School, Monterey, CA USA

Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time

Hagan, Joel J; Slack, William G; Dec 2006; 127 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462668; No Copyright; Avail.: CASI: [A07](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462668>

The goal of this project was to determine how to decrease the F414 engine throughput time at the Aircraft Intermediate Maintenance Division (AIMD) at Naval Air Station (NAS) Lemoore, California. To achieve this goal, organizational modeling was employed to evaluate how changes to the organizational structure of the Lemoore AIMD affected engine throughput time. Data collected to build the organizational model was acquired via interviews with AIMD personnel. A baseline model of the AIMD organization was developed for the purpose of modeling the organization's current structure and performance. The actual, real-world, duration required to conduct F414 maintenance was compared to the duration predicted by the model and determined to be within 3%. Once confidence was gained that the baseline model accurately depicted the organization's actual F414 maintenance performance, modifications or interventions to the model were made to evaluate how organizational changes would affect F414 maintenance duration. Interventions included paralleling the tasks associated with accomplishing administrative paperwork when initially receiving the F414 engine, and tasks associated with on-engine maintenance, combining personnel positions, adding personnel, and modifying the duration and frequency of meetings. The modeled results of these modifications indicated that the paralleling effort significantly decreased the F414 maintenance duration; likewise, decreasing meeting frequency and slightly increasing duration also facilitated a decreased duration.

DTIC

Aircraft Engines; Fighter Aircraft; Maintenance; Simulation

20070013274 Wyoming Univ., Laramie, WY USA

Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors

Armstrong, William D; Lindberg, William R; McInroy, John E; Naughton, Jonathan W; Dec 13, 2006; 36 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0358

Report No.(s): AD-A463491; UWAA-2006-2; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An investigation of the use of actuators that cause aerodynamic disturbances that could be used for flutter control was investigated. Flutter control requires large disturbances to produce the aerodynamic loads needed to oppose the flutter forces. As a result, oscillating fence actuators that have low power consumption and high control authority that scales with flight speed were studied. These fence actuators were tested in laminar and turbulent boundary layers to characterize the disturbances they produced. They have also recently been studied on a two-dimensional airfoil. By modeling the disturbances produced by these actuators, control modeling indicated that they could be used to dampen flutter-like motion. As a result of these initial findings, it is concluded that the use of such actuators for flutter controls is promising and should be investigated further.

DTIC

Actuators; Control Equipment; Flutter; High Frequencies; Vibration Damping

20070013315 Air Force Research Lab., Wright-Patterson AFB, OH USA

Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint)

Doman, David B; Oppenheimer, Michael W; Bolender, Michael A; Sep 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-A03D

Report No.(s): AD-A463583; AFRL-VA-WP-TP-2006-332; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Over the past decade, both NASA and the U.S. Air Force have directed significant efforts aimed at reducing the cost of access to space as well as improving the reliability and safety of launch vehicles. From a guidance and control perspective, efforts have focused on the development of fault tolerant autonomous systems that can recover vehicles from failures or damage when physically possible. The state of the art is summarized in this manuscript and some of the challenges preventing

widespread use of some of the techniques are discussed. The integration of vehicle health management systems with adaptive guidance and control is also discussed.

DTIC

Adaptive Control; Flight Control; Hypersonic Vehicles; Progress

03

AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; airport ground operations; flight safety and hazards; and aircraft accidents. Systems and hardware specific to ground operations of aircraft and to airport construction are covered in 09 Research and Support Facilities (Air). Air traffic control is covered in 04 Aircraft Communications and Navigation. For related information see also 16 Space Transportation and Safety and 85 Technology Utilization and Surface Transportation.

20070011417 Executive Office of the President, Washington, DC USA

National Aeronautics Research and Development Policy

Dec 2006; 19 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462521; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This National Aeronautics Research and Development Policy, along with its accompanying Executive Order signed by President Bush on December 20, 2006 will guide U.S. aeronautics research and development (R&D) programs through 2020. It was developed through a collaborative interagency process under the overarching goal to advance U.S. technological leadership in aeronautics by fostering a vibrant and dynamic aeronautics R&D community that includes government industry and academia. This goal is supported in the Policy by principles and objectives that will drive Federal aeronautics R&D activities and guidelines that delineate agency roles and responsibilities in the following areas: (1) stable and long-term foundational research: (2) advanced aircraft systems development: (3) air transportation management systems; and (4) national research development test and evaluation infrastructure.

DTIC

Aeronautics; Policies; Research and Development; Research Management; United States

20070011495 Federal Aviation Administration, Washington, DC, USA

Federal Aviation Administration, Office of Airports (ARP) Business Plan, 2007

January 2007; 48 pp.; In English

Report No.(s): PB2007-106925; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Safety is the Federal Aviation Administration's (FAA) primary responsibility. Our dedication to keeping airports safe is central to the public's interest, as well as the economic health of aviation. As an organization, the Office of Airports (ARP) provides leadership to the airport and aviation community to ensure that the National Plan of Integrated Airport Systems (NPIAS) is planned and developed to meet FAA mission goals. The ARP organization has a continuing stake in the safety, security, capacity, financial, and environmental aspects of airports. Indeed, the organization's major business challenge is to improve the safety, capacity, and condition of U.S. airports and to maintain a level on investment for airport infrastructure projects that benefits the National Airspace System.

NTIS

Airports; Commerce

20070011567 Government Accountability Office, Washington, DC, USA

Aviation Security: TSA's Staffing Allocation Model Is Useful for Allocating Staff among Airports, but Its Assumptions Should Be Systematically Reassessed

Feb. 2007; 96 pp.; In English

Report No.(s): PB2007-106605; GAO-07-299; No Copyright; Avail.: National Technical Information Service (NTIS)

TSA aims to ensure that its Staffing Allocation Model provides a sufficient number of TSOs to perform passenger and checked baggage screening by: (1) building assumptions into its allocation model that are designed to calculate the necessary levels of TSOs to ensure security and minimize wait times, and (2) employing multiple monitoring mechanisms for the sufficiency of the model's outputs. However, TSA faces some challenges to effective implementation of the model, primarily in ensuring that the model's key assumptions reflect operating conditions across airports. The model determines the annual TSO allocation for each airport by first considering the workload demands unique to each airport based on an estimate of each airport's peak passenger volume. This input is then processed against certain TSA assumptions about screening passengers and

checked baggage--including expected processing rates, required staffing for passenger lanes and baggage equipment based on standard operating procedures, and historical equipment alarm rates. To monitor the sufficiency of the model's allocation outputs, TSA has both field and headquarters-driven mechanisms in place. However, TSA does not have a mechanism, such as a documented plan, for selecting and prioritizing which assumptions to review each year and for assuring that all assumptions are periodically reviewed to help ensure that they are current with and reflect actual operating conditions. Without a plan for periodically validating all of the assumptions, TSA is at risk of assumptions becoming outdated, which could result in TSO allocations that do not reflect operating conditions.

NTIS

Airports; Security; Transportation

20070011682 Federal Aviation Administration, Washington, DC USA

Age 60 Aviation Rulemaking Committee: Report to the Federal Aviation Administration, November 29, 2006

Nov. 29, 2006; 36 pp.; In English

Report No.(s): PB2007-106329; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Federal Aviation Administration (FAA) established the Age 60 Aviation Rulemaking Committee (ARC) to make recommendations on whether the FAA should adopt the International Civil Aviation Organization (ICAO) age standard and what actions the FAA would have to take if it adopted the standard. To determine whether it would recommend adopting the ICAO standard, the ARC created two working groups: one to prepare a position paper on adopting the ICAO standard and one to prepare a position paper on not adopting the ICAO standard. Each working group presented its position to the ARC for discussion.

NTIS

Age Factor; Civil Aviation; Pilots

20070012828 Defence Science and Technology Organisation, Victoria, Australia

The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery

Best, Christopher; Jul 2006; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462950; DSTO-TR-1906; AR-013-721; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462950>

Accurate perception of position and self-movement is a critical factor for many tasks in aviation; particularly low-level flight, take off and landing. An especially demanding task of this kind is that of deck landings for rotary-wing aircraft, which are often conducted during the night. During night operations, ship-based lighting is used to assist the aircrew and flight-deck staff in the conduct of take-off and landing. While reasonably effective, the lighting systems currently employed by the Royal Australian Navy (RAN) were not designed specifically with the aim of enhancing aircrew visual perception. In two experiments a deck-edge light (DEL) system which provides a richer visual cueing environment for the aircrew than traditional point-source lighting systems was investigated in terms of its potential benefits for aircrew visual perception. These experiments could reveal no clear performance advantage for DELs over standard point-source lights. In both experiments, participants were asked to make ratings of their confidence in their judgments. Only a very weak relationship was found between accuracy and confidence, suggesting that care should be exercised when subjective ratings are interpreted in place of performance data. Further investigation is required in order to understand the potential of DEL systems for enhancing the safety of night operations.

DTIC

Helicopters; Illuminating; Luminaires; Ships

20070012839 Air Univ., Maxwell AFB, AL USA

Airpower, Afghanistan, and the Future of Warfare: An Alternative View

Wills, Craig D; Nov 2006; 91 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462965; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462965>

The Future of Warfare means increasing the emphasis on air support to the joint fight. The USAF continues to promote the importance of air superiority, acquiring aircraft and training pilots to attain air dominance. American Airmen do not want a long engagement to gain air superiority in the event of battle with a major power. On the other hand, American airpower has reached new levels of effectiveness with night-and day, all-weather, stealth, and precision bombing sustained with surprisingly sensitive surveillance-and-reconnaissance capabilities for target identification and battle damage assessment. The

enforcement of the no-fly zones over Iraq, known as Operations Northern and Southern Watch, during the 1990s as well as the wars in Bosnia, Operation Allied Force in 1999; in Afghanistan, Operation Enduring Freedom in 2001; and in Iraq, Operation Iraqi Freedom in 2003 highlighted the singular effectiveness of airpower to predominate in some joint and combined forms of war. Lt Col Craig D. Wills examines this rather new application of airpower in the long-running history of direct support of ground-combat operations an activity long declared by thoughtful Airmen as doctrinally unsuitable for airpower. Now it seems that this air support to ground forces can be considered a core mission function. Wills maintains that the twentieth-century argument between air and ground proponents has changed significantly since the Gulf War and that it comes down to the relative importance of the ground or air in the mix. It is more than just using air as a supporting component to the ground forces if this is true, current force organization and employment are adequate. However, if the air predominates in combat operations, then, as Wills puts it in his first chapter, joint-operations doctrine needs to be rethought. A changed balance will affect the military at every level...force structure, organization, weapons acquisition, doctrine, and training (p.3).

DTIC

Afghanistan

20070012853 Air Force Research Lab., Brooks AFB, TX USA

Causes and Effects of Fatigue in Experienced Military Aircrew

Miller, James C; Melfi, Mary L; Jan 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-7757

Report No.(s): AD-A462989; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462989>

The purpose of this investigation was to determine what aircrews perceived about fatigue countermeasures, whether they had been fatigued in flight, what might have caused fatigue in the cockpit, and whether they would have benefited from medication during crew rest and while airborne to counteract the effects of fatigue. Data were collected with self-report survey, eliciting responses from 162 pilots and navigators with experience in fighter, airlift, tanker, helicopter and bomber aircraft types. A high proportion of the respondents had logged more than 3,000 military flight hours. The pattern of responses indicated that: Episodes of unintentional sleep may be common in cockpits throughout the USAF; Episodes of fatigue-induced performance degradation may be common in cockpits throughout the USAF; Degraded situational awareness and slowed reaction time due to fatigue had been experienced while flying; Disruption of the circadian rhythm was the greatest contributor to losing sleep and becoming fatigued; Improper mission scheduling may be the main cause for in-flight fatigue; Poor sleeping quarters contribute to in-flight fatigue; The aircrews had received sufficient training and education on the different countermeasures that combat fatigue, but still reported personal experiences of fatigue in the cockpit; There were overall biases against the use of Go and No-Go pills, but biases in favor of using them among those who had actually used them as fatigue countermeasures for missions.

DTIC

Flight Crews; Sleep

20070012904 State Univ. of New York, Oneonta, NY USA

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions

Guzy, Lawrence; Alberty, William; Bowden, David; Sep 2006; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-7184

Report No.(s): AD-A463081; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463081>

The effect of multisensory cues (3-D, audio, tactile belt) to overcome a vestibular illusion in a rotating Barany Chair was investigated. Seated subjects were rotated about their spinal axis (Z axis) from a standing stop to a predetermined velocity. The acceleration experienced by the subjects as they changed velocity caused their semi-circular canals to react which they sensed as a rotation. When the chair was slowed, or stopped, the direction of the acceleration cue reversed and the subjects sensed a false rotation in the opposite direction. This illusion, called the somatogyral illusion, can occur in flight. The purpose of this research was to see if multisensory countermeasures could be applied to the subjects that would reduce or eliminate the false rotation. The 3-D audio countermeasure proved to be successful in reducing the velocity of the chair's rotation and the tactile belt countermeasure produced the highest success rating among the subjects.

DTIC

Cues; Flight Crews; Hearing; Illusions; Touch; Vestibules

20070012926 Southwest Research Inst., San Antonio, TX USA

Evaluations of QMI After-Market Additives

Frame, Edwin A; Feb 2007; 110 pp.; In English

Contract(s)/Grant(s): DAAE07-99-C-L053

Report No.(s): AD-A463121; TFLRF-382; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463121>

Three types of QMI after-market additives were evaluated to determine their effects on the properties of military products. The additives were (1) a fuel additive, (2) an engine oil additive, and (3) a gear oil additive. The major adverse effects observed were that the QMI engine oil additive reduced the viscosity of Military engine oil, and reduced the Flash Point. Low temperature properties of the engine oil were slightly improved. The QMI gear oil additive produced the following adverse effects: decreased the Flash Point of the gear oil and increased low temperature viscosity and foaming characteristics. The QMI fuel additive was blended in JP-8 with the following adverse effects: reduced Cetane Number, and reduced water separation tendencies. Fuel lubricity was improved for ground vehicle applications, and a slight improvement ($\Delta 2\%$) in fuel economy was measured with the additive in JP-8. PM and NO_x exhaust emissions from a diesel engine were unchanged with the QMI fuel additive present. Finally, with the QMI fuel additive present, diesel engine piston deposits were increased in the Caterpillar (Cat) 1K/1N test.

DTIC

Additives; Evaluation; Lubricants; Lubricating Oils; Oil Additives; System Effectiveness

20070012938 Space and Naval Warfare Systems Command, San Diego, CA USA

Dynamic Decision Support for Time Critical Targeting

Gizzi, Nick; McDonnell, John; Rice, Aaron; Jun 2006; 49 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463167; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463167>

Tactical air command and control systems must consider a multitude of environmental and operational conditions when reassigning assets, which often results in a lengthy decision process. This paper presents a suite of tools that are intended to compress the kill-chain by providing support for the planning and reassignment of tactical air strike assets. These tools provide a collaborative planning environment, enhance situational awareness, assess risk, and provide options for dealing with changes in the battle-space environment. Each tool is described and a simple scenario is provided to demonstrate the usage of the tools.

DTIC

Decision Support Systems; Time Dependence

20070012970 Space and Naval Warfare Systems Center, San Diego, CA USA

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II

DiVita, Joseph; Morris, Robert; Osga, Glenn; Jun 2006; 38 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463316; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463316>

In our previous research, we hypothesize that the performance of a supervisory control operator that must process tasks recommended by a system task manager is analogous to the performance of a vacationing server, M/Er/1 queue. Thus, we assume that the arrival of tasks is Markovian and that service consists of r - stages of processing each of which is exponentially distributed. In addition, we assume that when there are no tasks in the queue to process, the operator takes a vacation, i.e., goes off and performs other duties. The model assumed vacation time was exponentially distributed. We derived the queueing statistics for this system. These statistics include (1) the average number of customers (tasks) in the queue, (2) the average time a task spends in the queue, and (3) the average waiting time in the queue. We extended this model to a two-class priority M/Er/1 vacationing server system. The results of these predictions were compared to actual operator performance. Our current research generalizes the arrival processes. That is, instead of assuming that the arrival of tasks follows a Poisson process, we assume a Markov-Modulated Poisson Process (MMPP). The MMPP allows for a change in the rate in which tasks arrive to the system. Thus, rush hour effects and the ebb and flow of task arrivals may be taken into account by the new model. In the Command and Control environment, it is particularly important to estimate the rush hour effect on time critical events. A new set of queueing statistics was generated for a two-class MMPP/M/1 vacationing server system. This allowed us to compare the model to operator performance on the test scenario over extended periods of time.

DTIC

Air Defense; Command and Control; Human Performance; Performance Prediction; Queueing Theory; Teams; Warfare

20070012997 Naval War Coll., Newport, RI USA

The Evolution of Airpower Theory and Future Air Strategies for Employment in the Gap

Brown, Francis M; May 16, 2005; 26 pp.; In English

Report No.(s): AD-A463395; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463395>

Thomas P.M. Barnett, in his book 'The Pentagon's New Map: War and Peace in the Twenty-First Century,' predicts future USA military involvement to be focused in the disconnected regions of the world he calls the Gap. He theorizes that the overall goal of the use of U.S. instruments of power in the Gap is to connect these disconnected states to the world's functioning democracies that he labels the Core. In regards to future military involvement and specifically the application of airpower, what are the best air strategies to pursue, not only to achieve the strategic objectives, but to facilitate the desired end state of a connected emerging democracy? The original air theorists envisioned using airpower decisively, attacking an enemy's strategic and operational Centers of Gravity (COGs), making fielded forces irrelevant. Since the end of the Cold War, the U.S. retains the military capabilities to be the Hobbesian Leviathan in almost any future conflict. Has this overwhelming advantage in the air, focused on strategic COGs, been as decisive as the theorists envisioned? Can airpower be used effectively to coerce despotic Gap dictators to behave in accordance with accepted Core rule sets? Recent conflicts indicate that traditional airpower theories and strategies may not be as decisive as predicted. Future conflicts in the Gap are going to involve more innovative thinking to achieve the strategic objectives of the conflict while facilitating the desired end state. The realities of superior U.S. firepower require a reconsideration of the applicability and effectiveness of traditional airpower theory. Airpower needs to be brought to bear more surgically and jointly, doing only minimal damage to the economic, industrial, and informational systems to achieve the desired effects on the future battlefields of the Gap.

DTIC

Gaps

20070013260 Air War Coll., Maxwell AFB, AL USA

Who Pushes the Pickle Button

Marselus, John E; Nov 2005; 49 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463465; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Tension has risen on the frontline battlefields in the air between the aviators executing their missions and their command and control. This tension has resulted in many aviators asking the question 'Who is pushing the pickle button?' Just because technology has given the ability to reach into the cockpit of the frontline aviators doesn't mean this should necessarily be done. Present ROE (Rules of Engagement) and technology do not alleviate the frontline aviator of his moral or lawful responsibilities. Where did this trend start and how has it manifested itself throughout the past decade of aerial warfare? What can a CFACC (Combined Forces Air Component Commander) do to alleviate this tension? More importantly, what can the CFACC do to ensure that the JFC's (Joint Force Commander) campaign plan is being executed in the manner in which he intends and with the highest level of success? There are many factors to be considered on both sides of the issue pertinent to this discussion. First the issues of morality, law, and doctrine will be discussed. Second, how this trend was nurtured throughout our operations over the past decade will be tracked and discussed. Finally, several recommendations for today's CFACC will be outlined that best alleviate this tension. This will ultimately result in the CFACC being able to prosecute aerial warfare with the highest level of effectiveness and efficiency, which will be crucial to future warfare.

DTIC

Command and Control; Pilots

20070013264 Air War Coll., Maxwell AFB, AL USA

Leveraging Simulation Against the F-16 Flying Training Gap

McGrath, Shaun R; Nov 2005; 31 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463470; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Air combat training is becoming increasingly constrained by shrinking budgets, airspace limitations for countermeasures and supersonic employment, and operational taskings that limit continuation training opportunities. Therefore, this myriad of constraints and restraints further hamstring the peacetime mission essential competencies training gap driven in large part by concerns for personnel, equipment, and environmental safety. Finally, as if the challenge were not big enough, recent and rapid technology changes have exacerbated the problem, especially for the F-16 community.

DTIC

Education; F-16 Aircraft; Flight Simulation; Flight Training; Simulation

20070013266 Air War Coll., Maxwell AFB, AL USA

Pesky Critters

Kloeppel, Kirk M; Nov 2005; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463474; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The synergy of quantum physics, nanotechnology, and the new science of biomimicry portend the bedrock of the machinery needed to produce the housefly unmanned vehicle, a sensor device no enemy could hid from. This paper looks at the technology needed for such a device. The goal of building a miniature vehicle by 2020 or 2030 is achievable. The current state of research is providing a firm foundation.

DTIC

Drone Vehicles; Microminiaturization

20070013305 Air War Coll., Maxwell AFB, AL USA

Lowering the High Ground: Using Near-Space Vehicles for Persistent C3ISR

Knoedler, Andrew J; Nov 2005; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463564; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Department of Defense (DOD), military service, and industry leaders have focused on increasing command, control, communications, intelligence, surveillance, and reconnaissance (C3ISR) persistence. As of today, the air and space platforms do not provide persistent C3ISR. Platforms exploiting near space will be part of an integrated solution to increase persistent C3ISR. This paper covers the capabilities and limitations of current C3ISR platforms supporting battlespace awareness. After identifying the deficiencies, the essay then explores the various platform and payload combinations that can reach the near space altitudes of 20 to 150 kilometers (km). Finally, the paper concludes with a comparison of capabilities and concepts of operations (CONOPS) for several near-space vehicle (NSV) constellations.

DTIC

Airships; High Altitude

20070013341 Composite Technology Development, Inc., Lafayette, CO USA

Development of a Passively Deployed Roll-Out Solar Array

Barrett, Rory; Campbell, Douglas; Lake, Mark S; Adams, Larry; Taylor, Robert; Scherbarth, Mark R; Welsh, Jeffrey; Freebury, Gregg; Beidleman, Neal; Abbot, Jamie; Jan 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9453-05-C-0049; FA9453-05-C-0050; Proj-3005

Report No.(s): AD-A463695; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Advanced solar arrays capable of generating greater than 50 kW of total power, at power densities greater than 250 W/kg, are required for many future Air Force missions. The largest heritage systems are limited to less than 20 kW of total power, at roughly 80 W/kg. To meet the requirements of future Air Force missions, the Rollout And Passively Deployed ARray (RAPDAR(TradeMark)) has been developed. This innovative, patent-pending design takes full advantage of the latest advances in thin-film photovoltaic and TEMBO(registered) Elastic Memory Composite (EMC) deployment technologies. A key feature of the design is the use of solar energy to passively actuate the TEMBO EMC members and deploy the array. The present paper addresses the development and validation of detailed designs for the RAPDAR structural system. Specific focus is placed on comparing the performance projections of RAPDAR with other thin-film array systems, and the development and validation of the EMC longerons, which are the primary structural members for the RAPDAR system controlling packaging and deployment, and providing primary stiffness and strength to the deployed system.

DTIC

Deployment; Military Operations; Panels; Roll; Solar Arrays; Solar Cells

20070013367 Air Force Research Lab., Rome, NY USA

Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER)

Milligan, James R; Ahmed, Norman O; Jun 2005; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463759; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Current information systems are difficult to change to produce information that is tailored to the specific needs and context of end users. The information they produce is static, and application reengineering can be complex, costly and time consuming, potentially leading to system downtime. In addition, multiple information systems and sources can produce duplicate or inconsistent information that requires significant human effort to correlate, integrate and understand. The Joint

Battlespace Infosphere (JBI) is defined as a combat information management system that provides individual users with the specific information required for their functional responsibilities and provides uniform rules for publishing new and updated objects into the JBI and promptly alerts any JBI clients that have subscribed to such objects. The transform core service of the JBI enhances the value of information disseminated by the JBI through information manipulation mechanisms (fuselets) that tailor the information space to the specific needs of the warfighter and mission. This paper describes the results of an experiment that was designed to measure the validity and value of the JBI fuselet concept within the context an Air Operations Center (AOC) and a dynamic collaborative mission replanning scenario.

DTIC

Combat; Information Systems; Multisensor Fusion; Support Systems; User Requirements

20070013491 Ostrager Chong Flaherty and Broiman, LLP, New York, NY, USA

Airport Security System

Orlas, G.; 4 Mar 05; 5 pp.; In English

Contract(s)/Grant(s): N00024-00-C-6103

Patent Info.: Filed Filed 4 Mar 05; US-Patent-Appl-SN-10-906-757

Report No.(s): PB2007-101690; No Copyright; Avail.: CASI: [A01](#), Hardcopy

An airport security system includes a scanner scanning and time stamping an article of identification of an individual passing into a secure terminal area. The system further includes security cameras generating respective video signals of overlapping zones of coverage of the secure terminal area. The video signals are recorded and received in a controller generating a seamless video signal therefrom. Reversing of the seamless video signal allows visual tracking of a security breach in the secure terminal area from the time of breach identification scan and time stamp. Faster than real time forwarding of the seamless video signal allows tracking of the security breach from the time stamp to the breacher's present location within the secure terminal area.

NTIS

Airport Security; Warning Systems; Video Signals; Air Transportation

20070013686 Air War Coll., Maxwell AFB, AL USA

Small Power: The Role of Micro and Small UAVs in the Future

Abatti, James M; Nov 2005; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463472; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Every military faces decisions that ultimately impact its success in future operations. In 1851, Austrian military leaders made a decision to reject a revolutionary new breech-loading Dreyse needle gun that could be fired three times faster than muzzle-loaders. Their decision was based purely on budgetary issues. Austria's failure to acquire the Dreyse needle gun resulted in its defeat on the battlefield in July 1866 and the ultimate decline of the Austrian empire. The lessons learned apply today. Faced with declining budgets and the rapid advancement of new technologies, Air Force leaders face the same dilemma as their Austrian predecessors. Procuring the correct unmanned aerial vehicle (UAV) force structure will be a major challenge for the Air Force. This paper will identify the potential roles of micro and small UAVs in future conflicts. Based on research, this paper purports that these small low cost UAVs will be a significant force multiplier in the future. Budget and vehicle cost constraints will significantly impact the acquisition of large high-tech UAVs. Advances in technologies are rapidly increasing the capabilities of low cost micro and small UAVs. In addition, new concepts of operation, such as cooperative behavior protocols or swarming, will open the door to numerous missions once thought impossible for small low-cost, low-tech UAVs. To determine the utility of these smaller UAVs, this paper will analyze three main areas: the drivers, the enablers, and the missions. The drivers are the forces that sculpt the future requirement for smaller UAVs. The enablers, on the other hand, are the technologies and concepts of operation that give these smaller UAVs the capability to fulfill the future needs of the USAF. Finally, given the need and capability, the last section of this paper will discuss the missions that micro and small UAVs will fulfill in future conflicts.

DTIC

Drone Vehicles; Pilotless Aircraft; Military Technology; Microminiaturization

AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes all modes of communication with and between aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also 06 Avionics and Aircraft Instrumentation; 17 Space Communications, Spacecraft Communications, Command and Tracking; and 32 Communications and Radar.

20070011437 Naval Postgraduate School, Monterey, CA USA

Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV

Vonheeder, Steven R; Dec 2006; 140 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462714; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Autonomous underwater vehicle navigation is a complex problem of state estimation. Accurate navigation is made difficult due to a lack of reference navigation aids or use of the Global Positioning System (GPS) that could establish the vehicles position. Accurate navigation is critical due to the level of autonomy and range of missions and environments into which an underwater vehicle may be deployed. Navigational accuracy depends not only on the initialization and drift errors of the low cost Inertial Motion Unit (IMU) gyros and the speed over ground sensor, but also on the performance of the sensor fusion filter used. This thesis will present the method by which an Extended Kalman Filter (EKF) was tuned after installation of an IMU in the ARIES Autonomous Underwater Vehicle. The goal of installing the IMU, analyzing the navigational results and tuning the EKF was to achieve navigational accuracy in the horizontal plane with a position error of less than one percent of distance traveled when compared with GPS. The research consisted of IMU installation and software modifications within the vehicle to fully realize the design goal. Data collection and analysis was conducted through field experiments and computer simulation. A significant result of this work was development of a pseudo-adaptive algorithm to vary the measurement noise values in selected channels to force a desired response in the filter and improve accuracy and precision in the state estimates.

DTIC

Inertial Navigation; Low Cost; Tuning; Underwater Vehicles

20070012363 NASA Johnson Space Center, Houston, TX, USA

Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool

Huls, Dale thomas; May 26, 2005; 1 pp.; In English; International Association for the Advancement of Space Safety (IAASS) Conference, 25-27 Oct. 2005, Nice, France; No Copyright; Avail.: Other Sources; Abstract Only

The purpose of this paper is to explore an innovative approach to culture change at NASA that goes beyond reorganizations, management training, and a renewed emphasis on safety. Over the last five years, a technological social revolution has been emerging from the internet. Blogs (aka web logs) are transforming traditional communication and information sharing outlets away from established information sources such as the media. The Blogosphere has grown from zero blogs in 1999 to approximately 4.5 million as of November 2004 and is expected to double in 2005. Blogs have demonstrated incredible effectiveness and efficiency with regards to affecting major military and political events. Consequently, NASA should embrace the new information paradigm presented by blogging. NASA can derive exceptional benefits from the new technology as follows: 1) Personal blogs can overcome the silent safety culture by giving voice to concerns or questions that are not well understood or seemingly inconsequential to the NASA community at-large without the pressure of formally raising a potential false alarm. Since blogs can be open to Agency-wide participation, an incredible amount of resources from an extensive pool of experience can focus on a single issue, concern, or problem and quickly vetted, discussed and assessed for feasibility, significance, and criticality. The speed for which this could be obtained cannot be matched through any other process or procedure currently in use. 2) Through official NASA established blogs, lessons learned can be a real-time two way process that is formed and implemented from the ground level. Data mining of official NASA blogs and personal blogs of NASA personnel can identify hot button issues and concerns to senior management. 3) NASA blogs could function as a natural ombudsman for the NASA community. Through the recognition of issues being voiced by the community and taking a proactive stance on those issues, credibility within NASA Management can be restored. For NASA to harness the capabilities of blogs, NASA must develop an Agency-wide policy on blogging to encourage use and provide guidance. This policy should describe basic rules of conduct and content as well as a policy of non-retribution and/or anonymity. The Agency must provide sever space within their firewalls, provide appropriate software tools, and promote blogs in newsletters and official websites. By embracing the use of blogs, a potential pool of 19,000 experts could be available to address each posted safety issue, concern, problem, or question. Blogs could result in real NASA culture change.

Author

Communication; Technology Utilization; Aerospace Safety; NASA Programs

20070012837 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation

Veth, Mike; Raquet, John; Jan 2007; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462963; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462963>

Aircraft navigation information (position, velocity, and attitude) can be determined using optical measurements from imaging sensors combined with an inertial navigation system. This can be accomplished by tracking the locations of optical features in multiple images and using the resulting geometry to estimate and remove inertial errors. A critical factor governing the performance of optical inertial navigation systems is the robustness of the feature tracking algorithm. Robust feature tracking research has focused on developing multi-dimensional feature transformations which are invariant to camera pose variations. In addition, significant effort has been placed into algorithms designed to pair features between images from large sets (e.g., RANSAC). This traditional approach requires large computational resources, especially when presented with imaging situations with sparse, partially obscured, or repetitive features. In this paper, the method of multi-dimensional stochastic constraints is applied to the optical-inertial navigation problem in two dimensional feature space. The resulting navigation system uses inertial measurements to aid the feature tracking algorithm, which results in improvements in robustness and processing speed. The performance of the optical-inertial navigation system is demonstrated using experimental data.

DTIC

Inertial Navigation; Optical Measuring Instruments; Optical Properties; Stochastic Processes

20070012838 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Fusion of Low-Cost Imaging and Inertial Sensors for Navigation

Veth, Mike; Raquet, John; Jan 2007; 12 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462964; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462964>

Aircraft navigation information (position, velocity, and attitude) can be determined using optical measurements from imaging sensors combined with an inertial navigation system. This can be accomplished by tracking the locations of optical features in multiple images and using the resulting geometry to estimate and remove inertial errors. A critical factor governing the performance of image-aided inertial navigation systems is the robustness of the feature tracking algorithm. Previous research has shown the strength of rigorously coupling the image and inertial sensors at the measurement level using a tactical-grade inertial sensor. While the tactical-grade inertial sensor is a reasonable choice for larger platforms, the greater physical size and cost of the sensor limits its use in smaller, low-cost platforms. In this paper, an image-aided inertial navigation algorithm is implemented using a multi-dimensional stochastic feature tracker. In contrast to previous research, the algorithms are specifically evaluated for operation using lowcost, CMOS imagers and MEMS inertial sensors. The performance of the resulting image-aided inertial navigation system is evaluated using Monte Carlo simulation and experimental data and compared to the performance using more expensive inertial sensors.

DTIC

Air Navigation; Imaging Techniques; Inertial Navigation; Low Cost; Optical Properties

20070012842 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations

Veth, Mike; Raquet, John; Jan 2007; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462968; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462968>

Aircraft navigation information (position, velocity, and attitude) can be determined using optical measurements from an imaging sensor pointed toward the ground combined with an inertial navigation system. A critical factor governing the level of accuracy achievable in such a system is the alignment and calibration of the sensors. Currently, alignment accuracy is limited by machining and mounting tolerances for low-cost applications. In this paper, a novel alignment and calibration method is proposed which combines inertial and stellar observations using an extended Kalman filter algorithm. The approach is verified using simulation and experimental data, and conclusions regarding alignment accuracy versus sensor quality are drawn.

DTIC

Air Navigation; Alignment; Calibrating; Detection; Inertial Navigation; Optical Measurement; Optical Measuring Instruments; Stars

20070012894 Civil Aeromedical Inst., Oklahoma City, OK USA

Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays

Xing, Jing; Schroeder, David J; Mar 2006; 18 pp.; In English

Report No.(s): AD-A463063; DOT/FAA/AM-06/6; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463063>

The previous study showed that many colors were used in air traffic control displays. We also found that colors were used mainly for three purposes: capturing controllers' immediate attention, identifying targets, and segmenting information. This report is a continuing effort to reexamine the FAA's color vision standards, focused on understanding how individuals with color vision deficiencies use color-coded information. We first reviewed and synthesized the literature about the effectiveness of color relative to achromatic visual cues. Next, we developed several algorithms to assess the effects of color for individuals with color vision deficiencies. Using a computational algorithm that simulates how color deficient individuals perceive color, we were able to calculate the effectiveness of color in task performance. By considering together the effectiveness of redundant visual cues and the perception of those with color vision deficiencies, we provide a method to assess the potential effects of color deficiencies in using color displays.

DTIC

Air Traffic Control; Color; Color Vision; Display Devices

20070013606 Naval War Coll., Newport, RI USA

Effective USAF Air Traffic Control to Support Proposed Phase IV Operations

Hughes, Michael P; May 16, 2006; 28 pp.; In English

Report No.(s): AD-A463589; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In order to properly support the Joint Force Commander (JFC) and Joint Force Air Component Commander (JFACC) following major combat operations involving regime change, clear and effective doctrinal guidance must be established to support USAF Air Traffic Control (ATC) operations in Phase IV. ATC and associated airspace issues involve many detailed and time consuming issues that must be properly coordinated with both domestic and international aviation agencies in order to hand back a safe and effective host nation national airspace system (NAS).

DTIC

Air Traffic Control; Combat; Military Operations

05

AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes all stages of design of aircraft and aircraft structures and systems. Also includes aircraft testing, performance and evaluation, and aircraft and flight simulation technology. For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics. For land transportation vehicles see 85 Technology Utilization and Surface Transportation.

20070011418 National Defense Univ., Washington, DC USA

Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited

Lyons, John W; Chait, Richard; Long, Duncan; Sep 2006; 34 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462789; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In 2004, Dr. Thomas Killion, the Army Science and Technology (S&T) Executive, requested a series of reports detailing technology development for selected Army weapons systems. Dr. Killion was interested in studying the genesis of successful, fielded systems to gain insight into common factors that promoted technology development and integration. He was inspired in part by a similar study conducted by the Department of Defense (DoD) in the 1960s, called 'Project Hindsight.' Dr. Killion hoped that the findings of the studies could help guide decisions in managing the Army's S&T portfolio. The 'Hindsight Revisited' reports covered four Army weapons systems: (1) the Army's premier ground combat vehicle, the Abrams main battle tank; (2) the Apache attack helicopter; and (3) two manportable missile systems, the Stinger anti-aircraft missile and the Javelin anti-tank missile. This report collects and summarizes the findings from these three studies. Included here are findings related to the contributions of the Army's in-house laboratories, the Program Managers' (PM) offices, and industry. The authors compare these findings to the findings from the original 'Project Hindsight.' The report then offers recommendations, based on their findings for the four systems, for managing today's Army science and technology work. The paper concludes with commentary on two issues of current interest in today's environment: the problem of attracting and retaining talented

technical staff for the government's in-house laboratories, and the implications of recent changes in the acquisition process, as seen in the way the Future Combat Systems (FCS) program is being developed. The three 'Hindsight' papers had a common unit of analysis: the critical technology event, or CTE. CTEs are ideas, concepts, models, and analyses, including key technical and managerial decisions, that had a major impact on the development of a specific weapons system.

DTIC

Antiaircraft Missiles; Antitank Missiles; Attack Aircraft; Military Helicopters; Research Management; Weapon Systems; Weapons Development

20070012413 NASA Johnson Space Center, Houston, TX, USA, Pioneer Aerospace Corp., South Windsor, CT, USA, Fox Parachute Services, Belleville, WY, USA

Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System

Bennett, Thomas W.; Fox, Roy; [2007]; 4 pp.; In English; 18th AIAA Aerodynamic Decelerator Systems Technology Conference and Seminar, 23-26 May 2005, Munich, Germany

Contract(s)/Grant(s): NAS9-00076; Copyright; Avail.: CASI: [A01](#), Hardcopy

The purpose of this paper is to describe the design, development and flight testing of the U.S. Army 4200 ft(sup 2) parafoil recovery system built under NASA Contract NAS9-00076. The 4200 ft(sup 2) parafoil described herein was a potential candidate to fulfill the U.S. Army requirement for a 10,000 lb useable payload precision guided recovery system. Design heritage as well as specific features, like lower surface inlets, confluence fitting, upper surface energy modulator design, deployment bag design and 60 ft diameter Ringslot drogue will be discussed. Initial flight test results, ground testing of various components to verify design margin and configuration changes will also be discussed. The 4200 ft(sup 2) parafoil recovery system completed three flight tests during 2003 at payload weights of over 15,000 lbs.

Author

Flight Tests; Parafoils; NASA Space Programs; Systems Engineering; Aircraft Configurations

20070012795 Naval Postgraduate School, Monterey, CA USA

Joint Strike Fighter Across the Atlantic: To Unify or Divide

Reinhard, Scott W; Dec 2006; 139 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462641; No Copyright; Avail.: CASI: [A07](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462641>

This thesis examines the procurement of fighter aircraft as an indication of transatlantic relations. Specifically it asks if European rationale toward purchasing the Joint Strike Fighter indicates its position toward increasing military capabilities and the importance placed on defense cooperation with the USA. Certain observers have suggested that the relentless U.S. pursuit of technology in the Revolution in Military Affairs has exacerbated the capabilities gap and encouraged the U.S. to act unilaterally. This thesis argues the JSF offers allies a means to circumvent recent damage done in the Atlantic Alliance. Through a case study of four countries expected to purchase the JSF to replace U.S.-made F-16 aircraft, this thesis concludes that rationale for some who have heretofore abstained from the program is worrisome, but the fact that some are electing to pursue other choices indicates further divergences in the transatlantic realm. Through the views of these countries and looking at the larger picture, the JSF will further divide Europe and the U.S. in defense relations, as the pursuit of military technology threatens to drive the U.S. away from multilateralism and toward a buy our equipment or be left out stance on the so-called network centric battlefield.

DTIC

Fighter Aircraft; International Relations; Military Operations; Procurement

20070012817 Naval Postgraduate School, Monterey, CA USA

Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles

Lewis, Laird-Phillip R; Dec 2006; 161 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462927; No Copyright; Avail.: CASI: [A08](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462927>

This work introduces the use of optimal control methods for path planning and control of autonomous vehicles in an obstacle-rich environment. Traditional techniques harbor non-optimal, closed architectures primarily derived at a time when computational complexity could significantly hinder overall system performance. Advancements in computing power, miniaturization, and numerical methods permit the utilization of online, optimal path planning and control, thereby improving system flexibility and autonomy. The backbone of this concept is state-of-the-art optimal control techniques involving

pseudospectral methods and sequential quadratic programming. Although this research focuses on a robotic car or Unmanned Ground Vehicle (UGV), several systems, including an Unmanned Aerial Vehicle (UAV) and a pendulum on a rotational base, are detailed to illustrating the technique's modularity. With respect to the UGV, optimal control methods permit the optimization of maneuver parameters while accounting for complex vehicle kinematics and workspace obstacles, represented as dynamic and path constraints respectively. The path constraints are modeled such that an obstacle of any shape or size can be included. Maneuvering trajectories are first generated in an open-loop architecture, followed by an application of these same techniques in feedback form. Lastly, model fidelity is increased to improve control over vehicle behavior and closed-loop performance and a local knowledge scenario is evaluated.

DTIC

Autonomy; Maneuverability; Obstacle Avoidance; Optimization; Trajectory Control

20070012830 Defence Science and Technology Organisation, Victoria, Australia

Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments

Rider, Andrew N; Sep 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462952; DSTO-TR-1919; AR-013-758; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462952>

Adhesively bonded repairs to metallic aircraft structure can be used in a variety of applications to solve difficult maintenance issues where traditional mechanically fastened repairs are often unsatisfactory. For example bonded repairs have been applied to reduce stress intensity in fatigue prone areas of aircraft and, thereby, extend service life of the component, providing substantial maintenance savings. Despite their valuable contribution to aircraft maintenance, bonded repairs are treated as fail-safe items when used on primary aircraft structure. One of the reasons for the lack of credit for bonded repairs is the absence of a reliable non-destructive inspection (NDI) technique that can guarantee bond quality and strength. One solution to reduce this problem is the development of objective prebond inspection techniques that can guarantee the quality and reliability of the critical surface treatment process applied prior to the adhesive bonding operation. The use of a gloss-meter unit and surface quality monitor to quantify the prebond condition of metallic substrates is an effort to further improve the reliability and reproducibility of current bonding operations.

DTIC

Adhesive Bonding; Inspection; Maintenance; Surface Treatment

20070012832 Defence Science and Technology Organisation, Victoria, Australia

Review of Methods and Approaches for the Structural Risk Assessment of Aircraft

White, Paul; Oct 2006; 75 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462955; DSTO-TR-1916; AR-013-746; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA462955>

This report looks at the published literature on methods and assumptions made in performing structural risk assessments on aircraft. Because the major contributor to the risk of structural failure is fatigue, most methods of risk assessment involve modelling the effect of fatigue growth by some probabilistic method. Many risk assessments use the equivalent initial flaw size approach to allow for the variability in fatigue crack growth. Common errors in the formulation are made in many risk assessments, which can be significant and are described in this report. It is found that the standard approach can produce an acceptable assessment of the probability of failure of an aircraft if care is taken in understanding what is being modelled and the assumptions on which the analysis is based. A number of case studies of risk assessments performed on different aircraft are summarised.

DTIC

Aircraft; Assessments; Risk; Structural Design

20070012877 Pisa Univ., Italy

Intelligent Control Management of Autonomous Air Vehicles

Innocenti, Mario; Pollini, Lorenzo; Bracci, Andrea; Jul 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-03-1-3064

Report No.(s): AD-A463037; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463037>

There are many issues in the general area of cooperative control of unmanned vehicles; one of particular interest is

cooperative path planning and mission planning in a dynamic scenario with moving targets and moving obstacles. A dynamic scenario prevents usually the use of many algorithms due to their inherently high computational cost. The report briefly overviews some existing procedures used to solve both path planning and mission planning problems, and then proposes alternative algorithms which have a lower computational cost. In particular, we propose a path-planning procedure based on the Constrained Delaunay Triangulation, and the geometric properties of the in-centers of triangles. This procedure is not optimal from the analytical standpoint but it has several advantages for real-time applications because it allows slower sampling times and produces safer paths. The proposed path planning method takes into account areas of the scenario that may be more dangerous for the flight vehicle, by simply summing a term to the length of each sub-path depending of the dangerousness of the zone it crosses. The report presents also a sub-optimal mission planning algorithm based on a dynamic clustering of the targets in order to have a less myopic view of the entire scenario. The procedure is feasible in terms of total computational load, with respect to an optimal solution, which is known to be NP-hard and not achievable in polynomial time.

DTIC

Adaptive Control; Autonomous Navigation; Autonomy; Drone Aircraft

20070012927 Analytical Processes/Engineered Solutions, Inc., Saint Louis, MO USA

Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration

Honeycutt, Kyle; Mar 2006; 122 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33615-98-D-3210-0027-03; Proj-A02P

Report No.(s): AD-A463125; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463125>

The challenges of designing modern aircraft continue to drive the development of more advanced analytical tools; often these more advanced analytical tools themselves require development of other enabling technologies such as powerful computers and associated software. The primary historical objective of this project was to develop the infrastructure and to demonstrate that key enabling technologies such as faster and bigger personal computers, as well as database and programming software, have evolved to the point that more advanced analytical tools for analyzing the damage tolerance of aircraft structures are now possible.

DTIC

Aircraft; Crack Propagation; Stress Intensity Factors; Support Systems

20070012980 Naval War Coll., Newport, RI USA

The Civil Reserve Air Fleet: A Vulnerable National Asset

Banholzer, David D; Feb 13, 2006; 37 pp.; In English

Report No.(s): AD-A463332; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463332>

U.S. military war planning is based upon the use of the Civil Reserve Air Fleet (CRAF) to augment organic air mobility assets when deploying and sustaining forces in a contingency. While the CRAF is a tremendous national asset, its resources are not suitable for operations into airfields vulnerable to surface-to-air missile threats or chemical, biological or radiological attack. If a major conventional war erupts and CRAF assets are restricted from operating into planned aerial ports of debarkation, (APODs) a combatant commander's planned force deployment flow will be affected and the deployment timeline will be extended. U.S. military strategic airlift assets will not be sufficient to adequately flow forces to the desired APODs after CRAF transload at an intermediate staging base. The impact will be significant and war plans will have to be reconsidered.

DTIC

Civil Aviation; Commercial Aircraft; Military Operations; Planning; Vulnerability; Warfare

20070013241 Naval War Coll., Newport, RI USA

Air War Beyond the First Island Chain: Implications of China's Military Modernization for U.S. Maritime Strategy

Little, David; Oct 23, 2006; 25 pp.; In English

Report No.(s): AD-A463438; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Since China's provocative military exercises across the Taiwan straits in March 1996, the strait remains calm and little has changed diplomatically, but the balance of power in the region is changing. The remarkable rate in which China has modernized its military in the last decade has left many to question its intentions and whether its modernization is based on a change in maritime strategy. Many analysts believe that if China truly intends to expand its regional control to the 'second

island chain,' they will have to build or acquire aircraft carriers to achieve this capability. Due to the technological challenges of building and maintaining aircraft carriers, China appears to be gaining a military capability to control the China Seas through non-conventional means. Although it is yet to be determined whether China has the capacity to piece together its modernized forces to achieve power projection beyond their costal waters, it is critical that U.S. maritime strategists recognize China is gaining the pieces without obtaining an aircraft carrier.

DTIC

China; Seas; Warfare

20070013242 Naval War Coll., Newport, RI USA

How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security?

Myers, Michael K; May 17, 2005; 28 pp.; In English

Report No.(s): AD-A463440; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Unmanned aerial vehicles (UAVs) are evolving into a preferred method of accomplishing overhead military intelligence, surveillance, and reconnaissance. Capable of carrying a variety of sensors and electronic tools, they can provide real-time still and video imagery, collect signal intelligence, support communications links, conduct electronic jamming, and even deliver munitions on targets. Their long loiter time, low detectability, relative inexpensiveness, and low-risk due to their unmanned nature have caused a revolution in battlefield surveillance. There is little wonder that they are now gaining attention in the nation's rush to increase homeland security and defense. Decision makers see them as force multipliers and perfect for patrolling borders, coasts, ports and critical infrastructure. As UAV technology continues to evolve, the types and capabilities of these vehicles will proliferate to meet individual customer requirements. Without an integration plan, applications across the homeland security and defense community will be pursued individually by each of the agencies involved. Each will have to grow its own UAV expertise and, in their rush to acquire this technology, will likely end up with incompatible systems, further complicating integrated homeland security and defense command and control. This very scenario played-out in the DoD as the services rushed UAVs still in development into the battlefields of Afghanistan and Iraq. In April 2005, the Chief of Staff of the Air Force commented that the U.S. military is now operating 750 UAVs in Iraq, jamming each other's radio frequencies and confusing command and control. There have been two mid-air collisions between UAVs and other airplanes in theater. This same scenario should not be allowed to evolve in the crowded skies over North America. The thesis of this paper is that the most efficient process for integrating UAVs into homeland security operations is to centralize responsibility under NORTHCOM.

DTIC

Defense Program; Drone Vehicles; Pilotless Aircraft; Security

20070013257 Air War Coll., Maxwell AFB, AL USA

Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons

Hauck, Daryl J; Nov 2005; 39 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463462; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A recent Rand report on chemical and biological weapons (CBW) identifies unmanned aerial vehicles(UAVs) as a feasible CBW delivery means by potential adversaries like North Korea. With significant concern regarding the ability to defend against a delivery vehicle several meters in size, imagine the difficulty in defending against a future scenario involving swarms of micro UAVs (MAVs) carrying genetic weapons with the potential to create powerful and precise political, economical, and military effects from a tiny payload. With a motivation towards avoiding technological surprise, this paper notes emerging trends in several technology areas that collectively point towards this possibility. In particular, biomimetics, micro electro-mechanical systems (MEMS), and nanotechnology offer great promise in enabling feasible MAVs as delivery platforms, while these same technologies along with genetic research may enable the packaging of powerful and precise weaponry (potentially target-specific) in a microscopic payload that could be carried by these MAVs. The MAV/genetic weapon combination may offer a capability with enough power, precision, discrimination, and military utility to challenge the notion of all biological weapons being considered weapons of mass destruction (WMD), thus widening their potential use. This paper begins with a discussion of general technological themes and the law of unintended consequences... themes that are continually reinforced as specific enabling technologies are encountered throughout the essay. Subsequent sections build on this foundation by investigating several technology challenges specific to the hypothetical threat system, MAVs carrying genetic weapons. The paper concludes with a discussion of existing or potential responses and offers recommendations on technologies and information the U.S. should seek to ban, delay or control.

DTIC

Biomimetics; Drone Vehicles; Genetics; Nanotechnology; Weapons

20070013312 General Accounting Office, Washington, DC USA

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses

Solis, William M; Borseth, Ann; Coleman, Grace; Mardis, Oscar; Thornton, Karen; Woods, Steve; Mar 6, 2007; 20 pp.; In English

Report No.(s): AD-A463574; GAO-07-367R; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The USA Air Force has described aerial refueling as a key capability. Currently, the Air Force uses two aircraft for aerial refueling: the KC-135 and the KC-10. While the KC-10 fleet has an average age greater than 20 years, the KC-135 fleet averages more than 46 years and is the oldest combat weapon system in the Air Force inventory. Consequently, the Air Force intends to replace or recapitalize the KC-135 first. According to Air Force officials, the recapitalization process may cost between \$72 billion and \$120 billion and will span decades. Because of broad congressional interest, the Government Accountability Office (GAO) is currently reviewing, under the Comptroller General's authority to conduct evaluations on his own initiative, the Analysis of Alternatives for the recapitalization of the KC-135 aircraft. On December 15, 2006, the GAO briefed congressional staff on our preliminary observations. This letter expands on the information discussed in that briefing and includes recommendations to the Secretary of Defense. The GAO plans to complete its review of the Analysis of Alternatives and report the results in early summer 2007.

DTIC

Armed Forces (United States); Budgeting; Cargo; Federal Budgets; Passengers; Refueling; Replacing; Tanker Aircraft

20070013319 Naval War Coll., Newport, RI USA

Persistent ISR from UAVs: Doctrinal Considerations for Operational Warfare

Krueger, Todd C; Feb 13, 2006; 29 pp.; In English

Report No.(s): AD-A463592; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Unmanned aerial vehicles (UAVs) of all varieties are saturating the battlespace, but little doctrine exists for their employment. At the operational level of war, UAVs are particularly valuable for providing persistent intelligence, surveillance, and reconnaissance (ISR) especially in the Global War on Terror (GWOT), where persistent ISR helps the commander overcome a small force-to-space ratio with time-sensitive targeting. The commander must balance the need for pre-planned collection missions with flexible coverage schemes. Tactical units are increasingly able to directly receive the data from such missions in raw format, but this must be balanced against the need for professional analysis of that data. At the operational level, significant command and control issues must be settled, such as the current trend toward overly centralized control enabled by network-centric continuous imagery feeds. This in turn mandates a need for tempering the desire for more information, as the intake can quickly become overwhelming. Additionally, commanders must avoid taking control of UAVs operated by tactical level units. Conversely, those tactical units should be allowed to have some degree of control over higher level UAVs, depending on the nature of the objectives they are pursuing. These issues point to the need for revisiting the doctrine guiding ISR and command/control principles.

DTIC

Drone Vehicles; Warfare

20070013322 Missouri Univ., Rolla, MO USA

Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint)

Gupta, K; Ghasr, M T; Kharkovsky, S; Zoughi, R; Stanley, R J; Padwal, A; O'Keefe, M; Palmer, D; Blackshire, James; Steffes, Gary; Wood, N; Jul 2006; 10 pp.; In English

Contract(s)/Grant(s): FA8650-04-C-5704; Proj-2510

Report No.(s): AD-A463597; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Critical aircraft structures are susceptible to hidden corrosion. Find-it and fix-it approaches are inefficient as it relates to managing the problems associated with corrosion. More comprehensive corrosion information may be obtained using data fusion from several detection and evaluation methods. To this end, microwave, conventional and pulsed eddy current data from a multi-layer corroded panel, representing an aircraft lap joint, are fused and used as inputs to a structural analysis model to obtain a comprehensive snapshot of the corroded environment. This paper presents the data fusion algorithm and the structural analysis model along with a discussion of the results.

DTIC

Airframes; Corrosion; Eddy Currents; Lap Joints; Microwaves; Paints

20070013332 Naval War Coll., Newport, RI USA

Joint Helicopter Command: The 'Purple' Evolution of Rotary-Wing Aviation

Hayes, Christopher D; Oct 23, 2006; 27 pp.; In English

Report No.(s): AD-A463638; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The role of rotary-wing forces in operational maneuver over land, over water, and in the littoral is a critical enabling capability in current and evolving U.S. doctrine. The helicopter is ubiquitous, but joint helicopter operational doctrine, operating and maintenance procedures are not. Individual service cultures cultivate helicopter operating concepts that perpetuate intraservice relevance, but do not leverage the role of rotary-wing aviation in an integrated approach to joint warfighting. This paper examines the role of the UK's Joint Helicopter Command (JHC) in transforming Britain's ability to deliver effective combat helicopter forces to the Joint Commander. It illustrates how the JHC architecture supports effects based operations through an integrated joint approach to doctrine, infrastructure, training support and supportability across the Services. Finally, based on an established requirement to continue integration of U.S. helicopter forces, the paper suggests a U.S. Joint Rotary-Wing Command concept, prototyped on the JHC.

DTIC

Helicopters; Military Operations; Rotary Wings

20070013347 Naval War Coll., Newport, RI USA

The Way Ahead For Maritime UAVS

Pearson ,II, F C; Oct 23, 2006; 34 pp.; In English

Report No.(s): AD-A463705; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Unmanned aerial vehicles (UAVs) have proven to be an integral tool for the operational commander as a provider of persistent intelligence, surveillance and reconnaissance (ISR). UAVs are essential for conducting and executing modern military operations. They address a small force-to-space ratio problem by increasing the speed of the kill chain. UAV technology applications have progressed from ISR to an ever expanding list of uses. There is an overarching USN plan for UAVs, but I propose an emphasis should be placed on the close range or tactical UAVs that will directly complement battle space management, increase situational awareness and will increase the flexibility and capability of the kill chain for operational level commanders. Tactical UAVs will assist with gaining and sharing battle force access for naval and joint forces. They will increase the on-demand capability to gain ISR information and allow the flexibility to project power. The USN needs a better road map for tactical UAVs to exploit emerging capabilities and utilize them in maritime roles which will ensure Maritime Domain Awareness.

DTIC

Drone Vehicles; Military Operations; Surveillance

20070013483 Swedish Defence Research Establishment, Linköping, Sweden

Operator Site 2004-2005 (Operatoersplatsen 2004-2005)

Lars, E.; Otto, C.; Jonathan, B.; Joakim, D.; Patrik, L.; Dec. 2005; 74 pp.; In English

Report No.(s): PB2007-105510; FOI-R-1871-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

The project Operator Site had its main research activities focused on testing display interface concepts, aimed to improve operator function and performance by means of interface improvements for a selection of settings or platforms. Primarily auditory, tactile, and visual displays interfaces were in focus. The overall goals included contributing to the improvement of operator situation awareness and performance, with lowered or maintained mental workload, in tasks more or less critical for the success of specific parts of operations. We employed a variety of settings and operators. The most apparent specifications of them, in experiments and other types of studies, were the driver in Combat Vehicle 90, the pilot in Gripen fighter aircraft, the reconnaissance soldier with unmanned ground vehicle, the rifle soldier as related to Combat Boat 90, and the fire and rescue command operator in command centre.

NTIS

Human Factors Engineering; Mental Performance; Military Operations; Workloads (Psychophysiology)

20070013532 Government Accountability Office, Washington, DC, USA

State Department: State Has Initiated a More Systematic Approach for Managing Its Aviation Fleet

Feb. 2007; 41 pp.; In English

Report No.(s): PB2007-106142; GAO-07-264; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Department of States (State) Bureau of International Narcotics and Law Enforcement Affairs (INL) owns 357

helicopters and fixed-wing aircraft (valued at over \$340 million) primarily to help carry out its counternarcotics efforts, such as aerial eradication of drug crops in Colombia. INL relies on contractor support to help maintain and operate its aircraft. In 2004, GAO analysis showed that INL lagged behind other agencies in implementing Office of Management and Budget (OMB) and General Services Administration (GSA) aviation fleet management principles. GAO was mandated to review INLs management and oversight of this fleet. GAO specifically examined (1) the extent INL has complied with OMB and GSA aviation fleet management guidance and (2) how INL has overseen its aviation support contracts. Since INL has undertaken initiatives to address the weaknesses GAO observed, GAO makes no recommendations. GAO will follow up to ensure that these initiatives are completed, as planned. In comments on this report, State highlighted reforms under way. State also indicated that INL conducted analyses to justify most aviation investments. GAO notes, however, that the documentation provided did not reflect the key analyses called for by OMB guidance.

NTIS

General Aviation Aircraft; Law (Jurisprudence)

06

AVIONICS AND AIRCRAFT INSTRUMENTATION

Includes all avionics systems, cockpit and cabin display devices, and flight instruments intended for use in aircraft. For related information see also 04 Aircraft Communications and Navigation; 08 Aircraft Stability and Control; 19 Spacecraft Instrumentation and Astrionics; and 35 Instrumentation and Photography.

20070013705 NASA Johnson Space Center, Houston, TX, USA

Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities

James, George H., III; [2007]; 1 pp.; In English; CANEUS/NASA 'Fly-by-Wireless' Workshop, 27-28 Mar. 2007, Grapeville, TX, USA; No Copyright; Avail.: Other Sources; Abstract Only

This presentation will clarify some of the structural measurement needs of NASA's Space Shuttle and Crew Exploration Vehicles. Emerging technologies in wireless sensor systems can be of some advantage in both Programs. The presentation will address how wireless instrumentation has helped in the past and what has gone unmeasured on Shuttle due to various limitations. Finally, it will address the needs of the CEV program that can be met with reliable wireless systems, if modular avionics interfaces are provided to accommodate the usual evolving needs of an ambitious space vehicle development program. Examples of the advantages of flight data to support flight certification engineering analyses and of areas where add-on wireless instrumentation can be used will be shown. Without flight instrumentation, it is necessary to retain the conservative assumptions used in the design process. It will be shown how the lessons learned on Space Shuttle for wired and wireless structural measurements apply to the Orion Crew Exploration Vehicle (CEV), which is currently being designed.

Author

Crew Exploration Vehicle; NASA Space Programs; Wireless Communication; Sensors; Avionics; Dynamic Structural Analysis

07

AIRCRAFT PROPULSION AND POWER

Includes primary propulsion systems and related systems and components, e.g., gas turbine engines, compressors, and fuel systems; and onboard auxiliary power plants for aircraft. For related information see also 20 Spacecraft Propulsion and Power; 28 Propellants and Fuels; and 44 Energy Production and Conversion.

20070013298 Texas Univ., San Antonio, TX USA

Innovative Methods for Engine Health Monitoring

Chen, C L; Pantic-Tanner, Z; Millwater, H; Hudak, S; Huang, Y; Cotae, P; Tanner, D; John, E; Chan, K; Wang, X; Nov 30, 2006; 68 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0254

Report No.(s): AD-A463539; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The University of Texas San Antonio (UTSA), including Southwest Research Institute, is developing engine health monitoring (EHM) technology that compliments the ongoing and planned research within AFRL. The program consists of three distinct but related task areas that span EHM from a systems engineering level, to a specific damage-based life prediction processor, to a durability assessment of sensing materials. Task 1 is a systems level capstone effort focused on the information management, diagnostics and prognostics of EHM systems. The objectives are to develop Bayesian learning and neural networks for learning the unknown aspects of nonlinear engine systems and sensor sensitivity analysis. Task 2 is focused on

developing a probabilistic fracture mechanics model and ASIC (application specific integrated circuit) implementation for efficient on-board and real-time assessment of the damage state of critical engine components. The effort is to develop hardware such that sophisticated probabilistic fracture mechanics algorithms can be placed on-board for evaluation of detected defects. Task 3 is focused on the development of much-needed durability models for thin film sensors that are either in common use or likely candidates for monitoring changes in engine performance or detecting and monitoring defects in fracture critical engine components.

DTIC

Aircraft Engines; Health

20070013556 Bachman and Lapointe, P.C., New Haven, CT, USA

Turbine Engine disk Spacers

Suciu, G. L.; Norris, J. W.; 15 Apr 04; 11 pp.; In English

Contract(s)/Grant(s): AF-F33615-97-C-2779

Patent Info.: Filed Filed 15 Apr 04; US-Patent-Appl-SN-10-825-255

Report No.(s): PB2007-105963; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A gas turbine engine rotor stack includes one or more longitudinally outwardly concave spacers. The spacers may provide a longitudinal compression force that increases with rotational speed.

NTIS

Patent Applications; Spacers; Turbine Engines; Gas Turbine Engines

20070013558 Bachman and Lapointe, P.C., New Haven, CT, USA

Turbine Engine Rotor Retainer

Suciu, G. L.; Norris, J. W.; 15 Apr 04; 10 pp.; In English

Contract(s)/Grant(s): AF-F33615-97-C-2779

Patent Info.: Filed Filed 15 Apr 04; US-Patent-Appl-SN-10-825-256

Report No.(s): PB2007-105962; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A gas turbine engine has a rotor stack carried by a central shaft. A number of retainer segments each have a first surface engaging the rotor stack and a second surface engaging the central shaft so as to transmit a precompression force from the central shaft to the rotor stack.

NTIS

Patent Applications; Rotors; Turbine Engines; Gas Turbine Engines

08

AIRCRAFT STABILITY AND CONTROL

Includes flight dynamics, aircraft handling qualities, piloting, flight controls, and autopilots. For related information see also 05 Aircraft Design, Testing and Performance; and 06 Avionics and Aircraft Instrumentation.

20070011635 NASA Langley Research Center, Hampton, VA, USA

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance

Oseguera-Lohr, Rosa M.; Williams, David H.; Lewis, Elliot T.; February 2007; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): WBS 411931.02.81.07.01.03

Report No.(s): NASA/TM-2007-214538; L-19310; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011635>

This paper presents results from a simulation study which investigated the use of Continuous Descent Arrival (CDA) procedures for conducting a descent through a busy terminal area, using conventional transport-category automation. This research was part of the Low Noise Flight Procedures (LNFP) element within the Quiet Aircraft Technology (QAT) Project, that addressed development of flight guidance, and supporting pilot and Air Traffic Control (ATC) procedures for low noise operations. The procedures and chart were designed to be easy to understand, and to make it easy for the crew to make changes via the Flight Management Computer Control-Display Unit (FMC-CDU) to accommodate changes from ATC. The test runs

were intended to represent situations typical of what exists in many of today's terminal areas, including interruptions to the descent in the form of clearances issued by ATC.

Author

Crew Procedures (Inflight); Descent; Arrivals; Flight Management Systems; Aircraft Guidance; Air Traffic Control; Simulation

20070012871 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model

Veth, Michael; Raquet, John; Pachter, Meir; Jan 2007; 9 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463028; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463028>

The navigation state (position, velocity, and attitude) can be determined using optical measurements from an imaging sensor pointed toward the ground. Extracting navigation information from an image sequence depends on tracking the location of stationary objects in multiple images, which is generally termed the correspondence problem. This is an active area of research and many algorithms exist which attempt to solve this problem by identifying a unique feature in one image and then searching subsequent images for a feature match. In general, the correspondence problem is plagued by feature ambiguity, temporal feature changes, and occlusions which are difficult for a computer to address. Constraining the correspondence search to a subset of the image plane has the dual advantage of increasing robustness by limiting false matches and improving search speed. A number of ad-hoc methods to constrain the correspondence search have been proposed in the literature. In this paper, a rigorous stochastic projection method is developed which constrains the correspondence search space by incorporating a priori knowledge of the aircraft navigation state using inertial measurements and a statistical terrain model. The stochastic projection algorithm is verified using Monte Carlo simulation and flight data. The constrained correspondence search area is shown to accurately predict the pixel location of a feature with an arbitrary level of confidence, thus promising improved speed and robustness of conventional algorithms.

DTIC

Aerial Photography; Air Navigation; Image Processing; Stochastic Processes; Terrain

20070013351 Defence Science and Technology Organisation, Edinburgh, Australia

Collision Avoidance W-Band FMCW Radars in an Altimeter Application

Hansen, H J; Lindop, R; Majstorovic, D; Aug 2006; 31 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463712; DSTO-TR-1939; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The frequency modulated continuous wave (FMCW) radar principle has been used in aircraft radio altimeters to measure height above the surface of the Earth. This paper describes the performance of a typical commercial-off-the-shelf 77 GHz automobile collision avoidance radar that is been adapted for an Unmanned Aerial Vehicle (UAV) altimeter application. A lap top-based, bench-top assembly is described.

DTIC

Altimeters; Collision Avoidance; Continuous Radiation; Frequency Modulation; Radio Altimeters

09

RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, runways, hangars, and aircraft repair and overhaul facilities; wind tunnels, water tunnels, and shock tubes; flight simulators; and aircraft engine test stands. Also includes airport ground equipment and systems. For airport ground operations see *03 Air Transportation and Safety*. For astronomical facilities see *14 Ground Support Systems and Facilities (Space)*.

20070011550 Arkansas Univ., Little Rock, AR, USA

Automated Survey and Visual Database Development for Airport and Local Highway Pavement

Wang, K. C. P.; Jan. 16, 2007; 10 pp.; In English

Report No.(s): PB2007-105516; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes a new imaging technique applied in the pavement distress survey on airport runways. The Digital Highway Data Vehicle (DHDV) developed at the University of Arkansas was used to conduct the runway pavement distress survey for Hartsfield Atlanta International Airport (HAIA) in October 2001 and September 2004. DHDV is a multi-function survey device designed to collect and analyze various data sets on highway and airport pavements. The pavement imaging sub-system in the DHDV successfully accomplished the survey tasks for the airport runways. It is faster, safer and more

consistent than manual surveys. Analysis results between the two surveys in 2001 and 2004 are presented in the paper which shows the trend of the deterioration of the runway pavement in HAIA and the effectiveness of the higher resolution of the imaging system at 1-mm.

NTIS

Airports; Data Bases; Highways; Imaging Techniques; Pavements; Runways

20070013349 Library of Congress, Washington, DC USA

Airport Improvement Program: Issues for Congress

Kirk, Robert S; Feb 26, 2007; 55 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463708; CRS-RL33891; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The Airport Improvement Program (AIP) has been providing federal grants for airport development and planning since the passage of the Airport and Airway Improvement Act of 1982 (P.L. 97-248). AIP funding is usually spent on projects that support aircraft operations such as runways, taxiways, aprons, noise abatement, land purchase, and safety or emergency equipment. The funds obligated for the AIP are drawn from the Airport and Airway Trust Fund (hereafter referred to as the trust fund), which is supported by a variety of user fees and fuel taxes. The AIP is one of five major sources of airport capital development funding. The other sources are tax-exempt bonds, passenger facility charges (PFCs: a local tax levied on each boarding passenger), state and local grants, and airport operating revenue. Different airports use different combinations of these sources depending on the individual airport's financial situation and the type of project being considered. Small airports are more dependent on AIP grants than large or mediumsized airports. The larger airports, whose projects tend to be much more costly, are more likely to participate in the tax-exempt bond market or finance capital development projects with a PFC.

DTIC

Airports; Financial Management

12

ASTRONAUTICS (GENERAL)

Includes general research topics related to space flight and manned and unmanned space vehicles, platforms or objects launched into, or assembled in, outer space; and related components and equipment. Also includes manufacturing and maintenance of such vehicles or platforms. For specific topics in astronautics see *categories 13 through 20*. For extraterrestrial exploration see *91 Lunar and Planetary Science and Exploration*.

20070011563 Government Accountability Office, Washington, DC, USA

NASA's System for Tracking Foreign Contracts and Subcontracts

Nov. 09, 2006; 7 pp.; In English

Report No.(s): PB2007-106078; GAO-07-142R; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The National Aeronautics and Space Administration (NASA) is the nation's leading research and development organization in the fields of space and aeronautics. Each year, NASA spends almost 90 percent of its annual budget on the acquisition of supplies and services in order to fulfill the agency's mission to pioneer the future in space exploration, scientific discovery, and aeronautics research. NASA purchases these supplies and services from both U.S. and foreign contractors. Although most contracts were awarded to U.S. contractors, NASA, in fiscal year 2004, also awarded contracts to vendors in 23 countries. The National Aeronautics and Space Administration Authorization Act of 2005 requires the NASA Administrator to annually report to Congress on NASA's contracts and subcontracts performed overseas and purchases from foreign entities. The report should also indicate contracts and subcontracts and their dollar values for goods and services that are only available from foreign sources as well as items and their dollar values for which the Buy American Act was waived pursuant to obligations of the USA under international agreements. According to the reporting requirement, the first annual report is due no later than January 2007. Based on Congressional interest in ensuring that NASA will have the data to meet the new reporting requirements, we examined how NASA will track contracts and subcontracts performed overseas, foreign purchases, and the use of Buy American Act exceptions. We also determined whether NASA collects and analyzes data to assess its supplier base. NASA will not fully meet congressional reporting requirements on fiscal year 2006 foreign purchases by January 2007 because it is not collecting all the data needed to do so. Currently, NASA can track its contracts performed overseas and purchases of foreign goods and services through information contained in the Federal Procurement Data System-Next Generation (FPDS-NG)--an upgrade to the governmentwide information system on federal procurement contracts. As NASA relies on FPDS-NG, which currently does not track information on subcontracts or Buy American Act exceptions used in foreign purchases, NASA officials stated that they cannot report on this information at this time. A recent

change made to the FPDS-NG will allow NASA to start collecting Buy American Act data for its fiscal year 2007 purchases, and NASA plans to work with the Office of Management and Budget (OMB) to collect subcontract information under a pilot program to be implemented by July 2007. However, NASA will not have this information available to meet the January 2007 reporting date. In addition, although NASA has collected supplier base data for its Space Shuttle program, it does not collect or analyze agencywide data on its suppliers.

NTIS

Contract Management; Policies; NASA Programs; International Law

20070012818 Surrey Univ., Guildford, UK

A Low-Cost Fementsatellite to Enable Distributed Space Missions

Barnhart, David J; Vladimirova, Tanya; Baker, Adam M; Sep 20, 2006; 16 pp.; In English

Report No.(s): AD-A462930; CI07-0023; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462930>

A new class of distributed space missions is emerging which requires hundreds to thousands of satellites for real-time, distributed, multi-point sensing to accomplish long-awaited remote sensing and science objectives. These missions, stymied by the lack of a low-cost mass-producible solution, can become reality by merging the concepts of distributed satellite systems and terrestrial wireless sensor networks. However, unlike terrestrial sensor nodes, space-based nodes must survive unique environmental hazards while undergoing complex orbital dynamics. A novel sub-kilogram very small satellite design is needed to meet these requirements. Sub-kilogram satellite concepts are developing elsewhere, such as traditional picosatellites and microengineered aerospace systems. Although viable technical solutions, these technologies currently come at a high cost due to their reliance on high-density technology or custom manufacturing processes. While evaluating these technologies, two untapped technology areas became evident that uniquely encompass low cost and mass producibility by leveraging existing commercial production techniques: satellite-on-a-chip and satellite-on-a printed-circuit-board. This paper focuses on the design, build, and test results of a prototype satellite-on-a printed-circuit-board with a prototype unit cost of only \$300. The paper concludes with mission applications and future direction.

DTIC

Design Analysis; Low Cost; Space Missions

20070012870 Library of Congress, Washington, DC USA

Military Role in Space Control: A Primer

Fernandez, Adolfo J; Sep 23, 2004; 25 pp.; In English

Report No.(s): AD-A463026; CRS-RL32602; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463026>

This report reviews Department of Defense (DoD) military space control efforts and related policy and resources. Since the 1991 Gulf War, U.S. military forces have become increasingly reliant on space resources for communications, intelligence imagery, weather, warning, navigation, and timing. Asserting that U.S. space assets have become an integral part of today's warfare, the DoD has begun to emphasize the importance of protecting these resources. Although U.S. military space systems have been relatively unchallenged, military leaders anticipate increasing threats to these systems, because they provide a significant military advantage. DoD defines space control as 'the combat, combat support, and combat service support operations to ensure freedom of action in space for the USA and its allies and, when directed, deny an adversary freedom of action in space.' DoD space control initiatives are embryonic and mostly represent legacy resources used for space surveillance. The DoD budget, however, identifies early stages of developing counterspace measures. Military space control efforts, like many other facets of military space, are in a significant phase of transition. The ability of the USA to harness space power may be critical to victory on the battlefield, especially as information dominance becomes more pervasive in the ensuing evolution of network centric warfare. Congress might be faced with decisions involving the projection of military operations into space, survivability of space systems, and DoD programs to promote a continual awareness of activities in space. This report will not be updated.

DTIC

Aerospace Systems; Artificial Satellites; Defense Program; Military Operations; Policies; Vulnerability

20070013574 Defence Research and Development Canada, Ottawa, Ontario Canada

An Operational Framework for Battle in Network Space

Knight, R D; MacIntyre, M; Jan 2006; 27 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463292; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463292>

Presentation Outline: (1) Principals of warfare for net space; (2) Mapping IO to network battlespace; (3) A main defensive battle in net space; (4) A vision for computer network operations; (5) Some useful analogies? CDD imagery - Air tasking order - Combat logistics.

DTIC

Communication Networks; Computer Networks; Warfare

15

LAUNCH VEHICLES AND LAUNCH OPERATIONS

Includes all classes of launch vehicles, launch/space vehicle systems, and boosters; and launch operations. For related information see also *18 Spacecraft Design, Testing and Performance*; and *20 Spacecraft Propulsion and Power*.

20070011413 Defence Research and Development Canada, Ottawa, Ontario Canada

Space-Based Observations of Satellites From the MOST Microsatellite

Scott, R L; Wallace, B; Bedard, D; Nov 2006; 61 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462866; DRDC-ONTARIO-TM-2006-199; No Copyright; Avail.: CASI: [A04](#), Hardcopy

On October 12th 2005, Canada's MOST spacecraft acquired Canada's first microsatellitebased observations of a deep space satellite. MOST repeated this success by conducting an observation on a different spacecraft the following day. This report summarizes the experimental setup, access particulars, metric and photometry data. Comparison of the derived orbital metric data with high precision ephemerides yielded root mean square errors of 13 arcseconds. The errors are shown to result largely from timing uncertainties inherent in the MOST spacecraft. The space-based photometric measurements of these spacecraft were consistent with ground based observations. Analysis of these results indicates that microsatellite platforms show technical promise as a low cost means to conduct space surveillance from an orbiting platform.

DTIC

Artificial Satellites; Microsatellites

20070012876 Cambridge Univ., Cambridge, UK

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses

Thompson, Sarah; Mycroft, Alan; Nov 27, 2006; 30 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-06-1-3021

Report No.(s): AD-A463036; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463036>

In order to be viable, spacecraft must mass relatively little, while being capable of surviving the G-forces and vibration of launch. In space, they must withstand extreme temperatures, hard vacuum and high levels of radiation for years without maintenance. Conventionally, spacecraft wiring harnesses are built with architectures that are fixed at the time of manufacture. They must therefore be designed to endure the lifetime of the mission. Reducing the mass of a spacecraft's wiring harness, without compromising reliability, is highly desirable. Recent advances in MEMS-based switching have made it possible to consider the construction of reconfigurable manifolds - essentially, wiring harnesses that behave like macroscopic FPGA routing networks. Redundant wiring can be shared between many signals, thereby significantly reducing the total amount of cable required. Reconfigurability has a significant further benefit, in that it also allows adaptation to mission requirements that change over time, while also significantly reducing design time. The US Air Force has been moving toward a responsive space paradigm which aims to reduce the time from design concept to launch (currently several years) to less than one week; a parts-bin driven, plug-and-play approach to satellite construction will become essential. It must be possible to choose a satellite chassis of a size appropriate to the task, then bolt everything together and have the resulting satellite just work. We present an approach that allows such a reconfigurable manifold to be automatically self-configured, then dynamically tested in-situ, such that signals are automatically rerouted around non-functioning wires and switches as soon as faults are detected. Make-before-break switching is used in order to allow wires to that are currently in use to be rerouted transparently from the point of view of subsystems that are interconnected by the manifold, whilst also making it possible to achieve near-100% testability.

DTIC

Design Analysis; Dynamic Tests; Electrical Engineering; Harnesses; Systems Engineering; Wiring

20070012903 Air Force Research Lab., Hanscom AFB, MA USA

Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing

Bernstein, L S; Braunstein, M; Broadfoot, A L; Dimpfl, W L; Dressler, R A; Chiu, Y; Gardner, J A; Murad, E; Feb 22, 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A463080; AFRL-VS-HA-TR-2007-1011; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463080>

Near-UV OH(A-X) and NH(A-X) emission bands at ~3100 and 3360 Angstrom, respectively, have been observed in the far-field radiance from the shuttle vernier reaction control system engine exhaust using the GLO imager spectrograph located in the payload bay during the STS-74 mission. Spectra were collected at a resolution of 4 Angstrom for daytime solar illumination conditions during low-Earth-orbit maneuvers. A temporal analysis (2 s temporal resolution) of spectral features is presented for an extended vernier reaction control system burn. The spectrum is dominated by the narrow NH(A-X) band. Both NH(A-X) and OH(A-X) features are shown to be proportional to the engine mass flow, and thus are produced by a single collision or solar-induced mechanism. Whereas a pure chemical mechanism, yet unknown, has been established for the NH(A-X) feature, the weaker OH(A-X) band is demonstrated to be primarily produced by the chemical reaction of atmospheric O with exhaust H₂O, with minor solar-induced contributions. The high signal-to-noise ratio for both bands allowed a more precise determination of excited state rovibrational populations compared with previous efforts. The present analysis is complemented with direct simulation Monte Carlo calculations of the engine-exhaust flow field and proposed radiation excitation mechanisms for the NH(A-X) and OH(A-X) emissions.

DTIC

Far Fields; Rocket Engines; Space Shuttles; Spectrum Analysis; Vernier Engines

20070012977 Naval War Coll., Newport, RI USA

Director of Space Forces: Refocused for the Way Ahead

Krystkowiak, Eric A; Feb 13, 2006; 29 pp.; In English

Report No.(s): AD-A463327; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463327>

Space capabilities are no longer novelties, rather, they are vitally important to the joint warfighter at every level. While there is very little debate about the ever-increasing significance or usefulness of space to the joint warfighter, the command and control (C2) of space forces at the operational level has been an evolutionary challenge with the creation of the Director of Space Forces (DIRSPACEFOR) during Operation IRAQI FREEDOM. While the construct has worked well in OIF, the doctrinal disposition of the DIRSPACEFOR has been inhibited by the fact that it is seen as an Air Force solution. In order to move forward on the DIRSPACEFOR construct, this paper uncovers the underlying parochial motivations that are hindering progress, thus enabling a clear perspective for the way ahead focused on unity of effort. This paper does not attempt to solve the parochial inclinations or even dictate the best C2 structure; instead, it reframes the polarizing issues surrounding the DIRSPACEFOR position to appropriately concentrate on the unique nature of space requirements and missions, rather than on the medium and ownership. Unity of effort, not an unrealistic unity of command, must be the mandate. This paper recommends incorporation of a revamped joint, inter-agency DIRSPACEFOR-like construct centered on unity of effort, while reinforcing the flexibility of the joint force commander (JFC) to structure space forces based upon the mission, not presumed ownership.

DTIC

Aerospace Systems; Command and Control

20070013162 Naval War Coll., Newport, RI USA

Whither Space Weapons: A Capability in Need of an Advocate

Blaettler, Daniel C; May 17, 2005; 22 pp.; In English

Report No.(s): AD-A463197; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Space weaponization has been a much debated topic over the past decade. The debate has included political and technical discussions on whether, with what, and for what purpose to weaponize space. Little has been written about space weaponization from the operational commander's perspective. Absent commentary from the combatant commanders, it is difficult to determine from a theater strategic perspective how space weapons might be employed to preserve peace and win wars. This paper highlights the problems inherent in the current technological, political and service parochial discussion

regarding space weapons and advocates that combatant commanders should be the primary voice and the determining factor on space weaponization.

DTIC

Space Weapons; Warfare

20070013237 Air War Coll., Maxwell AFB, AL USA

Sustained Space Superiority: A National Strategy for the USA

Schaefer, Larry J; Aug 2002; 58 pp.; In English

Report No.(s): AD-A463425; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The increasing importance of space for U.S. national security requires the nation to protect its interests by sustaining a position of space superiority. The forces of globalization are forcing the USA to move away from its historical stance of maintaining space as a sanctuary toward the concept of using weapons in space. The USA must prepare sufficient bridges to make the transition to using weapons in space in view of psychological impediments and treaty obligations, which must be orchestrated to support and protect the current uses of space while preparing for eventual conflict in space. This study examines a framework for organizing U.S. space activities into a coherent national strategy sustained space superiority. It analyzes several dimensions that affect a national strategy for U.S. space superiority, including its military, intelligence, and economic components. This national strategy for space superiority will require strong leadership and public support because this strategy will be expensive and involve a long-term commitment. While the USA enjoys space superiority today, this advantage will be lost if the nation does not take the necessary steps to sustain it.

DTIC

Aerospace Engineering; Space Weapons; United States; Warfare

20070013262 Air War Coll., Maxwell AFB, AL USA

Strategies for Defeating Commercial Imagery Systems

Latchford, Stephen; Dec 2005; 54 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463468; No Copyright; Avail.: CASI: [A04](#), Hardcopy

High-quality space-based imagery, once among America's most closely held secrets for force enhancement, is now openly available through commercial providers. The USA faces questions of how to keep this source of valuable intelligence information from its adversaries, and whether it is even possible or desirable to do so. This paper addresses strategies for countering the threat to military operations posed by commercial earth-sensing satellites. The paper emphasizes technical countermeasures, using a combination of nodal and value analysis to arrive at possible solutions. It also considers strategies necessary to make those countermeasures militarily useful and politically acceptable. The result of the research is a recommendation for long-term pursuit of co-orbital weapons with reversible effects, while in the short term, integrating current technology into ground-based and airborne radio-frequency jammers and low-power lasers for point defense. In the process it highlights the need for surge capacity in space lift, so the USA can have a defensive space-control capability without accelerating the arms race in space.

DTIC

Commerce; Countermeasures; Imagery; Satellite Imagery

20070013265 Air Univ. Press, Maxwell AFB, AL USA

Space Power Integration: Perspectives from Space Weapons Officers

Dec 2006; 224 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463471; No Copyright; Avail.: CASI: [A10](#), Hardcopy

In March 2005 the first Space Weapons Officer Air and Space Integration Conference was held at Maxwell Air Force Base, Alabama. The conference was a joint event between the Air Force Space Command and the Air Education and Training Command. This book comes out of that conference. The chapters in Space Power Integration address issues across a spectrum of air- and space-integration topics at the operational level of war. Several studies argue that current space doctrine regarding organization and command relationships needs to be revised, with recommendations ranging from subtle modifications to paradigm-changing constructs. It is important to note that a major revision to Air Force Doctrine Document (AFDD) 2-2, Space Operations, was in process at the time of the conference and during the preparation of this book. As such, many of the fundamental arguments about organizing space forces to best support the theater joint force commander may have been addressed within doctrine. Doctrine does not and cannot provide extensive implementation guidance and direction; therefore, Space Power Integration provides some perspectives from space operators who have had direct responsibilities for integrating

air and space power at the operational level of war. Space Power Integration begins with a chapter providing a space-power framework and a recommendation for how the space-coordinating authority should enable unity of effort for diverse information services from space. The next chapter builds upon that background by discussing the importance of counter-space operations and how they are needed to support counterterrorism. Background information in the early chapters helps the nonspace operator put the remaining chapters in better context. The following six chapters discuss various perspectives on problems due to the current command and control (C2) of deployed space forces organizational models.

DTIC

Space Weapons; Warfare

20070013336 Naval War Coll., Newport, RI USA

Space Dependence - A Critical Vulnerability of the Net-Centric Operational Commander

Grant, Matthew E; May 17, 2005; 23 pp.; In English

Report No.(s): AD-A463682; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The U.S. military of today is increasingly dependent on highly integrated, complex C2 systems at all levels of command. These complexities have the potential to cause a break down of C2 required by the operational commander. C2 failures become possible if supportive satellite systems are compromised by threats of natural means, rogue states, or non-state actors. Military commanders and systems dependent on satellite information, data, and processes must have alternative systems available to mitigate the loss of satellites at risk and vulnerable to attack. Today the U.S. military utilizes commercial satellites that are typically not shielded or hardened both kinetic and non-kinetic threats. Therefore, satellite protection is imperative in the 21st century. With a near-peer competitor like China or the potential instability and aggression of North Korea, the U.S. must consider all possibilities in defense of our national interests. The cascading effects of C2 degradation could be attributed to space systems and their vulnerabilities to natural and enemy threats. Operational commanders should promote and support the development of innovative techniques and procedures, to negate such threats to command and control networks and associated systems that are critical to combatant forces and their victory in war.

DTIC

Command and Control; Vulnerability

20070013342 Microcosm, Inc., El Segundo, CA USA

Development and Optimization of a Tridyne Pressurization System for Pressure Fed Launch Vehicles

Chakroborty, Shyama; Wollen, Mark; Malany, Lee; Jan 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9453-05-C-0143; Proj-1001

Report No.(s): AD-A463696; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Over the recent years, Microcosm has been pursuing the development of a Tridyne-based pressurization system and its implementation in the Scorpius family of launch vehicles to obtain substantial gain in payload to orbit. This technology program was initiated with an IR&D program and matured with contracts from the National Reconnaissance Office (NRO), and the Air Force Research Laboratory (AFRL). The Tridyne pressurization system functions by mixing small amounts of hydrogen and oxygen with the pressurant gas (typically helium). When the mixture is passed through a catalyst bed, the hydrogen and oxygen react to produce heat. The result is hot pressurant gas, with a small amount of water vapor remaining from the combustion process. The implementation scheme developed for the Scorpius family of launch vehicles involves returning some of the heat to the Tridyne mixture in the pressurant tank by means of an internal heat exchanger. This offsets the expansion cooling such that the temperature of the pressurant actually rises as the pressurant is used. The remaining energy is used to elevate the temperature of the gas delivered to the propellant tanks to near the maximum allowable operating temperature of the downstream components (typically about 200 to 250 deg F) such as the regulator and the composite over-wrapped propellant tanks. The result of heating the helium in this way was shown to reduce the mass and volume of required helium and the associated tankage by nearly 50%, resulting in substantial payload gain.

DTIC

Launch Vehicles; Optimization; Pressurizing

20070013345 Naval War Coll., Newport, RI USA

Operational Art for Space Control: Do the Principles of War Apply

Tromba, George E; Feb 13, 2006; 24 pp.; In English

Report No.(s): AD-A463702; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The technology of war has changed and joint force commanders must be prepared to fight symmetric and asymmetric

threats. Within this context, the US has committed to developing/fielding space control weapon systems. This presents a new challenge for the commander; how to employ a key component of operational art, the principles of war, to best create and execute effective and integrated space control courses of action and Strategy. DESERT SHIELD demonstrated the need for a thought-out and documented concept of employment derived from sound operational art prior to hostilities. Armed with capable systems but lacking key OPART components, it took US/Coalition forces over six minutes to disseminate detection/warning of the first Iraqi Scud launch. Had a matured and documented OPART been developed using the principles the time line would not have taken six minutes. All principles of war are applicable to space control operations. However, the principles of objective, offensive, and security serve as an optimal rallying point from which to create space control schema. Proponents of emerging concepts contend the principles are no longer valid, and in some cases applying the principles to space control may prove counterproductive to overarching objectives. The world has changed however the principles are still valid and effective in crafting space control COAs if considered within context of overarching objectives. Given the impending fielding/employment of space control weapon systems we must take time now to craft and document applicable OPART methods to ensure effective integration and employment of these capabilities.

DTIC

Aerospace Environments; Military Operations; Space Weapons; Warfare

20070013652 Naval War Coll., Newport, RI USA

Air Force Space Doctrine: Is It Ready for Weapons in Space?

Corley, Charles P; May 17, 2005; 22 pp.; In English

Report No.(s): AD-A463405; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The U.S. Air Force sometimes appears to have two identities. Not only is the U.S. Air Force arguably the best air-breathing air force in the world, it is also steward to the predominance of the nation's military space power. Because of the increased emphasis and importance of space to the warfighter, the U.S. is poised to put weapons in space to protect its satellite assets. Once space is weaponized, it is not beyond plausibility that the leap from defensive to offensive space-based weapons will occur. Within the U.S. Air Force itself, there are those who feel that the two mediums of air and space do not belong under the umbrella of a single service. Many in the space community feel that current space doctrine is stifled under the air-centric Air Force. Additionally, argument abounds that the Joint Force Air Component Commander (JFACC) should not have Air Force space assets under his control but that they should be under the control of a more space-minded (read additional) component commander. This paper addresses the possibility and unique advantages of offensive weapons in space. It further looks at current Air Force space doctrine and its applicability to offensive space-based weapons. Instead of finding a rift between air and space forces and doctrine, this paper finds that U.S. Air Force space doctrine is already well structured to support offensive space weapons and the JFACC who should and will be using them. The Air Force understands the unique characteristics of each medium but more importantly, understands these differences do not matter in the realm of force application.

DTIC

Warfare; Space Weapons; Air Defense

20070013713 NASA Marshall Space Flight Center, Huntsville, AL, USA

Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds

Decker, Ryan K.; Puperi, Daniel; Leach, Richard; [2007]; 7 pp.; In English; AIAA Aerospace Science Meeting-Atmospheric and Space Environments, 8-11 Jan. 2007, Reno, NV, USA

Contract(s)/Grant(s): 197009.10.01.01.03; Copyright; Avail.: CASI: [A02](#), Hardcopy

The National Aeronautics and Space Administration's (NASA) Space Shuttle utilizes atmospheric winds on day of launch to develop throttle and steering commands to best optimize vehicle performance while keeping structural loading on the vehicle within limits. The steering commands and resultant trajectory are influenced by both the high and low frequency component of the wind. However, the low frequency component has a greater effect on the ascent design. Change in the low frequency wind content from the time of trajectory design until launch can induce excessive loading on the vehicle. Wind change limits have been derived to protect from launching in an environment where these temporal changes occur. Process of developing wind change limits are discussed followed by an observational study of temporal wind change in low frequency wind profiles at the NASA's Kennedy Space Center area are presented.

Author

Launching; Space Shuttles; Wind Profiles; Frequency Shift; Ascent Trajectories

SPACE TRANSPORTATION AND SAFETY

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *03 Air Transportation and Safety*; *15 Launch Vehicles and Launch Operations*; and *18 Spacecraft Design, Testing and Performance*. For space suits see *54 Man/System Technology and Life Support*.

20070011493 NASA Johnson Space Center, Houston, TX, USA

The Importance of Multilateral Safety Requirements for Human Spaceflight

Pido, Kelle; October 27, 2005; 1 pp.; In English; 1st. International Association for the Advancement of Space Safety (IASS) Conference, 25-27 Oct. 2005, Nice, France; No Copyright; Avail.: Other Sources; Abstract Only

The International Space Station (ISS) Program initially implemented safety requirements in a series of bilateral agreements between NASA and each International Partner. As the program matured and multilateral processes began to be developed, the differences between these bilaterally agreed requirement sets became more significant. Efforts to develop multilateral safety requirements were hampered for many reasons including assessment of national standards used in the bilateral agreements, requirements baselines for existing contracts, and resource limitations to address requirements changes late in the development and operations phases. To avoid similar requirements issues in the future, international safety requirements need to be developed for human spaceflight. This paper will provide the background of the ISS bilateral Safety and Mission Assurance requirements and processes, describe the activities to develop multilateral safety requirements and processes, and give examples of issues that were encountered. Further, the paper will make recommendations regarding the development of international safety requirements for human spaceflight and the safety topics to be addressed.

Author

International Space Station; Mission Planning; Safety; Requirements

20070012398 NASA Johnson Space Center, Houston, TX, USA

External Cargo Integration Overview

Gueera, Alan; April 25, 2005; 29 pp.; In English; NASA Industry Day, 25 Apr. 2005, Houston, TX, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012398>

This viewgraph presentation reviews the system integration efforts for external cargo for the International Space Station (ISS). The role and responsibility of the External Carriers Office is reviewed. The presentation also reviews the application of the office to the Commercial Cargo Services contract.

CASI

Cargo; International Space Station; Systems Integration; Space Logistics; Payload Integration Plan

20070013536 GB Technology, Inc., Houston, TX, USA

An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris

Mulrooney, Mark; August 2004; 106 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A06](#), Hardcopy

Through an intensive collection and assimilation effort of Solid Rocket Motor (SRM) related data and resources, the author offers a resolution to the uncertainties surrounding SRM particulate generation, sufficiently so to enable a first-order incorporation of SRMs as a source term in space debris environment definition. The following five key conclusions are derived: 1) the emission of particles in the size regime of greatest concern from an orbital debris hazard perspective (D_v 100 micron), and in significant quantities, occurs only during the Tail-off phase of SRM burn activity, 2) the velocity of these emissions is correspondingly small - between 0 and 100 m/s, 3) the total Tail-off emitted mass is between approximately 0.04 and 0.65% of the initial propellant mass, 4) the majority of Tail-off emissions occur during the 30 second period that begins as the chamber pressure declines below approximately 34.5 kPa (5 psia) and 5) the size distribution for the emitted particles ranges from 100 micron to 5cm.

Author

Particulates; Size Distribution; Solid Propellant Rocket Engines; Space Debris

SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes space systems telemetry; space communications networks; astronavigation and guidance; and spacecraft radio blackout. For related information see also *04 Aircraft Communications and Navigation*; and *32 Communications and Radar*.

20070011771 NASA Glenn Research Center, Cleveland, OH, USA

R.F Microphotronics for NASA Space Communications Applications

Pouch, John; Nguyen, Hung; Lee, Richard; Miranda, Felix; Hossein-Zadeh, Mani; Cohen, David; Levi, A. F. J.; [2007]; 22 pp.; In English; Great Lakes Photonics Symposium/SPIE, 12-16 Jun. 2006, Dayton, OH, USA

Contract(s)/Grant(s): WBS 141141.06.01.02.03; Copyright; Avail.: CASI: [A03](#), Hardcopy

An RF microphotonic receiver has-been developed at Ka-band. The receiver consists of a lithium niobate micro-disk that enables RF-optical coupling to occur. The modulated optical signal (- 200 THz) is detected by the high-speed photonic signal processing electronics. When compared with an electronic approach, the microphotonic receiver technology offers 10 times smaller volume, smaller weight, and smaller power consumption; greater sensitivity; and optical isolation for use in extreme environments. The status of the technology development will be summarized, and the potential application of the receiver to NASA space communications systems will be described.

Author

Extremely High Frequencies; Space Communication; Photonics; Optical Coupling; Radio Receivers

20070012412 NASA Glenn Research Center, Cleveland, OH, USA

Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit

Welch, Bryan W.; February 2007; 38 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 439432.07.04.03.01

Report No.(s): NASA/TM-2007-214679; E-15815; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012412>

While navigation systems for the determination of the orbit of the Global Position System (GPS) have proven to be very effective, the current issues involve lowering the error in the GPS satellite ephemerides below their current level. In this document, the results of an orbit determination covariance assessment are provided. The analysis is intended to be the baseline orbit determination study comparing the benefits of adding laser ranging measurements from various numbers of ground stations. Results are shown for two starting longitude assumptions of the satellite location and for nine initial covariance cases for the GPS satellite state vector.

Author

Global Positioning System; Laser Ranging; Orbit Determination; Radiometers; Covariance

SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and spacecraft control and stability characteristics. For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance*; *39 Structural Mechanics*; and *16 Space Transportation and Safety*.

20070011630 Boeing Co., Houston, TX, USA

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair

Sims, Christopher R.; [2005]; 2 pp.; In English; AIAA Guidance, Navigation, and Control Conference and Exhibit, 15-19 Aug. 2005, San Francisco, CA, USA

Contract(s)/Grant(s): NAS15-10000; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011630>

This paper describes the design of the ISS Momentum Manager controllers for the Orbiter Repair Maneuver (ORM) and Orbiter Tile Repair operations. Momentum Manager Controllers provide non-propulsive attitude control via CMGs. Non-propulsive control is required at the beginning and the middle of the ORM and at the tile repair position. This paper first

reviews the design issues and requirements, then presents the design methodology, and concludes with analysis results that verify the design.

Author

International Space Station; Momentum; Thermal Protection; Space Shuttles; Spacecraft Guidance; Navigation; Control Systems Design; Spacecraft Maintenance

20070011728 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models

Wissler, Steven S.; Maldague, Pierre; Rocca, Jennifer; Seybold, Calina; June 19, 2006; 25 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39845>

The Deep Impact mission was ambitious and challenging. JPL's well proven, easily adaptable multi-mission sequence planning tools combined with integrated spacecraft subsystem models enabled a small operations team to develop, validate, and execute extremely complex sequence-based activities within very short development times. This paper focuses on the core planning tool used in the mission, APGEN. It shows how the multi-mission design and adaptability of APGEN made it possible to model spacecraft subsystems as well as ground assets throughout the lifecycle of the Deep Impact project, starting with models of initial, high-level mission objectives, and culminating in detailed predictions of spacecraft behavior during mission-critical activities.

Author

Space Missions; Software Development Tools; Spacecraft Models

20070012314 Paragon Space Development Corp., AZ, USA

Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft

Reavis, Gretchen; [2007]; 10 pp.; In English; Space Thermal Control Workshop, 27 Feb. - 1 Mar. 2007, El Segundo, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): NNJ05HF18C; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012314>

This viewgraph presentation reviews the history of pumped fluid loop radiators used in Apollo spacecraft, and the problems and challenges for using them in the Orion Spacecraft. Included in this presentation are the issues of Flow stagnation, flow stability, for single panels and multi-panels.

CASI

Flow Stability; Stagnation Flow; Spacecraft Radiators; Crew Exploration Vehicle; Fluid Flow

20070012369 NASA Johnson Space Center, Houston, TX, USA

Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors

Jacobs, Jeremy B.; Castner, William L.; March 2007; 48 pp.; In English; Original contains color illustrations

Report No.(s): NASA/TP-2007-213733; S-991; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012369>

In April 2004, the Space Shuttle Orbiter Reaction Control System (RCS) thruster serial number (S/N) 120 s injector was found to be cracked while undergoing a nozzle retrofit at the White Sands Test Facility (WSTF). The RCS is composed of safety-critical propulsion hardware elements used to control the attitude of the space shuttle orbiter during virtually all operational mission phases. Since a failure resulting from an RCS thruster burn-through (initiated from a crack) could be catastrophic, an official flight constraint was issued until flight safety could be adequately demonstrated. One recommendation was to reproduce the cracking in the laboratory to understand fully the driving environments. The Johnson Space Center (JSC) Materials & Processes (M&P) Branch initiated an effort starting in January 2005 to reproduce the cracking in the niobium injector. The results were successful. The specific conditions necessary to cause cracking were explicitly established and bounded. Each of the following conditions is necessary in combination: 1. A mechanically disturbed/cold-worked free surface (plastic deformation from machining, handling, fastener installation, etc.) 2. An externally applied sustained tensile stress near yield strength 3. Presence of fluorine-containing fluids on exposed tensile/cold-worked free surfaces 4. Sustained exposure to temperatures greater than 400 F

Derived from text

Failure Analysis; Cracks; Tensile Stress; Temperature Effects; Spacecraft Construction Materials; Flight Safety; Injectors

20070013728 NASA Marshall Space Flight Center, Huntsville, AL, USA

The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators

Ferguson, Dale C.; [2007]; 1 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan.. 2007, Reno, NV, USA; No Copyright; Avail.: Other Sources; Abstract Only

SEE program management originated at LaRC in the early 1990's but was transferred to MSFC in FY 1995 and has remained at Marshall since that time, SEE uses 5 technical working groups and NRA's (three since 1994) to achieve its technical objectives. The SEE vision is to develop and maintain a preeminent program in SPACE ENVIRONMENTS and EFFECTS which provides a coordinated national focus for innovative technology development to support design, development, and operation of spacecraft systems that will accommodate or mitigate effects due to the presence of the space environment. In working toward that goal, SEE has produced, through the years, over 30 major Space Environments and Effects Models and Databases, over 75 major Space Environments and Effects Publications, a website that has had over 112,000 hits since its inception (<http://see.msfc.nasa.gov/>), distribution of physical products that amounts to over a total of over 260 product deliveries, sponsorship of the last four international Spacecraft Charging Technology Conferences (the major subject matter conference in the world), and sponsorship of numerous technical standards and guidelines in the Space Environments area. Among the recent popular SEE products are the Electric Propulsion Interactions Code (EPIC), the NASA/Air Force Spacecraft Charging Analysis Program (NASCAP-2K), the Interactive Spacecraft Charging Handbook, the Cosmic Ray Effects on Microelectronics Code (CREME 96), the Spacecraft Contamination and Materials Outgassing Effects Knowledge base (SCMOEK), and the Lunar E-Library.

Author

Aerospace Environments; Spacecraft Design; NASA Programs; Microelectronics; Project Management

20070013731 NASA Marshall Space Flight Center, Huntsville, AL, USA

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle

Phillips, Mark; Hanson, John; Shmitt, Terri; Dukemand, Greg; Hays, Jim; Hill, Ashley; Garcia, Jessica; [2007]; 1 pp.; In English; 30th Annual AAS Guidance and Control Conference, 3-7 Feb. 2007, Breckenridge, CO, USA; No Copyright; Avail.: Other Sources; Abstract Only

By the time NASA's Exploration Systems Architecture Study (ESAS) report had been released to the public in December 2005, engineers at NASA's Marshall Space Flight Center had already initiated the first of a series of detailed design analysis cycles (DACs) for the Constellation Program Crew Launch Vehicle (CLV), which has been given the name Ares I. As a major component of the Constellation Architecture, the CLV's initial role will be to deliver crew and cargo aboard the newly conceived Crew Exploration Vehicle (CEV) to a staging orbit for eventual rendezvous with the International Space Station (ISS). However, the long-term goal and design focus of the CLV will be to provide launch services for a crewed CEV in support of lunar exploration missions. Key to the success of the CLV design effort and an integral part of each DAC is a detailed performance analysis tailored to assess nominal and dispersed performance of the vehicle, to determine performance sensitivities, and to generate design-driving dispersed trajectories. Results of these analyses provide valuable design information to the program for the current design as well as provide feedback to engineers on how to adjust the current design in order to maintain program goals. This paper presents a condensed subset of the CLV performance analyses performed during the CLV DAC-1 cycle. Deterministic studies include development of the CLV DAC-1 reference trajectories, identification of vehicle stage impact footprints, an assessment of launch window impacts to payload performance, and the computation of select CLV payload partials. Dispersion studies include definition of input uncertainties, Monte Carlo analysis of trajectory performance parameters based on input dispersions, assessment of CLV flight performance reserve (FPR), assessment of orbital insertion accuracy, and an assessment of bending load indicators due to dispersions in vehicle angle of attack and side slip angle. A short discussion of the various customers for the dispersion results, along with results and ramifications of each study, are also provided.

Author

Ares 1 Launch Vehicle; Design Analysis; Reliability Analysis; Damage Assessment; Flight Characteristics

SPACECRAFT INSTRUMENTATION AND ASTRIONICS

Includes the design, manufacture, or use of devices for the purpose of measuring, detecting, controlling, computing, recording, or processing data related to the operation of space vehicles or platforms. For related information see also *06 Avionics and Aircraft Instrumentation*; for spaceborne instruments not integral to the vehicle itself see *35 Instrumentation and Photography*; for spaceborne telescopes and other astronomical instruments see *89 Astronomy*.

20070012321 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments

Ashtijou, Mohammad; He, Yutao; Watson, R. Kevin; Bolotin, Gary S.; September 26, 2006; 5 pp.; In English; MAPLD International Conference, 26-28 Sep. 2006, Washington, DC, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39885>

This paper describes development of a radiation tolerant, low power, reconfigurable avionics module aimed at meeting the avionics needs of the JPL Micro-Inspector spacecraft. This module represents a complete avionics system, consisting of two PowerPC 405 CPUs embedded within a reconfigurable FPGA fabric of over 8 Million logic gates, 64MB of EDAC protected Flash storage and 128MB of EDAC protected DDR SDRAM or SDRAM memories, along with FPGA SEU mitigation logic, and all necessary power conversion. Processor SEU mitigation is achieved by running the two processors in a lock-step and compare configuration. All of these building blocks are integrated into a double sided circuit board that takes as little as 6 square inches of board space. This module can be embedded into a user system as part of a bigger circuit assembly or as a self contained module. This module is being developed as part of a JPL led Micro-Inspector Program, funded by NASA ESMD aimed at producing a 10Kg micro spacecraft.

Author

Avionics; Field-Programmable Gate Arrays; Circuit Boards; Single Event Upsets; Gates (Circuits)

20070013704 NASA Johnson Space Center, Houston, TX, USA

'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control

Studor, George; [2007]; 2 pp.; In English; CANEUS 'Fly-by-Wireless' Workshop, 27-28 Mar. 2007, Grapevine, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): 604746.01.98.10.29; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013704>

Aerospace vehicle programs have always counted on the cables and connectors to provide power, grounding, data and time synchronization throughout a vehicle's life-cycle. Even with numerous improvements, wiring and connector problems and sensors continue to be key failure points, causing many hours of troubleshooting and replacement. Costly flight delays have been precipitated by the need to troubleshoot cables/connections, and/or repair a sensor. Wiring continues to be too expensive to remove once it is installed, even with the weight penalties. Miles of test instrumentation and low flight sensor wires still plague the aerospace industry. New technology options for data connectivity, processing and micro/nano manufacturing are making it possible to retrofit existing vehicles, like the Space Shuttle. New vehicles can now develop architectures that provide for and take advantage of alternatives to wired connectivity. This project motivates the aerospace industry and technology providers to establish: (1) A new emphasis for system engineering approaches to reduce cables and connectors. (2) Provisions for modularity and accessibility in the vehicle architecture. (3) A set of technologies that support alternatives to wired connectivity.

Derived from text

Aerospace Vehicles; Systems Engineering; Wireless Communication; Spacecraft Control; Instruments

20070013727 NASA Marshall Space Flight Center, Huntsville, AL, USA

Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor

LeCroy, Jerry E.; Howard, Richard T.; Hallmark, Dean S.; [2007]; 12 pp.; In English; AIAA Aerospace Sciences Meeting, 7-11 Jan. 2007, Reno, NV, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Testing of the Advanced Video Guidance Sensor (AVGS) used for proximity operations navigation on the Orbital Express ASTRO spacecraft exposed several unanticipated imaging system artifacts and aberrations that required correction to meet critical navigation performance requirements. Mitigation actions are described for a number of system error sources, including lens aberration, optical train misalignment, laser speckle, target image defects, and detector nonlinearity/noise characteristics.

Sensor test requirements and protocols are described, along with a summary of test results from sensor confidence tests and system performance testing.

Author

Space Navigation; Guidance Sensors; Noise Measurement; Navigation Instruments; Laser Targets

20

SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power*, *28 Propellants and Fuels*, *15 Launch Vehicles and Launch Operations*, and *44 Energy Production and Conversion*.

20070011412 Naval Postgraduate School, Monterey, CA USA

Apparatus for Study of Ion-Thruster Propellant Ionization

Perry, Frank H; Dec 2006; 71 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462726; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Electric propulsion thrusters are considered to be candidates for microsatellites; ion engines are among the most scalable. Miniaturizing the ion engine will require novel concepts for the ionizer. MEMS, nanotechnology and other new technologies are expected to impact here. This thesis explores the use of these technologies to enable a new design for ion-thruster propellant ionization. An ideal approach, using expensive fabrication processes, is first described. This approach could prove to be a good method for testing and for the collection of precise data. A cost effective approach, on which our testing is based, is then discussed in detail. After assembling a facility which uses existing vacuum systems and available instrumentation, we manufactured and tested miniature discharge geometries consisting of commercial 2'x2' copper-clad wafers. Three nominal insulator thickness' were used, 0.005, 0.010' and 0.115.' The wafers were each drilled with 9 equal holes of diameters 300, 400, and 500 microns. A total of 12 wafers were tested (including 3 widths without holes for a baseline) for the breakdown voltage as a function of argon pressure in the range of 10 to 1000 mTorr. Results indicate that argon breakdown may occur in the holes consistent with the classical Paschen curves.

DTIC

Ion Engines; Ionization; Propellants

20070011514 Conte (Francis L.), Swampscott, MA, USA

Triple Circuit Turbine Blade

Lee, C. P.; Brassfield, S. R.; Prakash, C.; 20 Nov 03; 10 pp.; In English

Contract(s)/Grant(s): F33615-02-C-2212

Patent Info.: Filed Filed 20 Nov 03; US-Patent-Appl-SN-10-718 465

Report No.(s): PB2007-101620; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A turbine blade includes an airfoil having pressure and suction sidewalls extending between leading and trailing edges, and from root to tip. A dovetail is joined to the airfoil root at a platform. Three internal cooling circuits extend in span inside the airfoil, and each circuit includes a respective inlet channel commencing in axially adjacent alignment in the dovetail. The inlet channels twist together from the dovetail, through the platform, and into the airfoil behind the leading edge in transverse adjacent alignment across the sidewalls.

NTIS

Circuits; Turbine Blades; Airfoils

20070011542 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Analytical Ion Thruster Discharge Performance Model

Goebel, Dan M.; Wirz, Richard E.; Katz, Ira; July 9, 2006; 19 pp.; In English; AIAA 43rd Joint Propulsion Conference, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39812>

A particle and energy balance model of the plasma discharge in magnetic ring-cusp ion thrusters has been developed. The model follows the original work of Brophy in the development of global 0-D discharge models that utilize conservation of particles into and out of the thruster and conservation of energy into the discharge and out of the plasma in the form of charged particles to the walls and beam and plasma radiation. The present model is significantly expanded over Brophy's original work

by including self-consistent calculations of the internal neutral pressure, electron temperature, primary electron density, electrostatic ion confinement (due to the ring-cusp fields), plasma potential, discharge stability, and time dependent behavior during recycling. The model only requires information on the thruster geometry, ion optics performance and electrical inputs such as discharge voltage and currents, etc. to produce accurate performance curves of discharge loss versus mass utilization efficiency. The model has been benchmarked against the NEXIS Laboratory Model (LM) and Development Model (DM) thrusters, and successfully predicts the thruster discharge loss as a function of mass utilization efficiency for a variety of thrusters. The discharge performance model will be presented and results showing ion thruster performance and stability given.

Author

Plasma Radiation; Charged Particles; Particle Energy; Energy Conservation; Electron Density (Concentration); Electrostatics; Ion Engines; Internal Pressure

20070011637 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions

Oh, David Y.; Goebel, Dan M.; July 9, 2006; 12 pp.; In English; 42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39807>

This paper examines the benefit that a solar electric propulsion (SEP) system based on the 5 kW Xenon Ion Propulsion System (XIPS) could have for NASA's Discovery class deep space missions. The relative cost and performance of the commercial heritage XIPS system is compared to NSTAR ion thruster based systems on three Discovery class reference missions: 1) a Near Earth Asteroid Sample Return, 2) a Comet Rendezvous and 3) a Main Belt Asteroid Rendezvous. It is found that systems utilizing a single operating XIPS thruster provides significant performance advantages over a single operating NSTAR thruster. In fact, XIPS performs as well as systems utilizing two operating NSTAR thrusters, and still costs less than the NSTAR system with a single operating thruster. This makes XIPS based SEP a competitive and attractive candidate for Discovery class science missions.

Author

Solar Electric Propulsion; Ion Propulsion; Ion Engines; Xenon; Sample Return Missions; Asteroid Missions; Space Rendezvous; Performance Tests

20070012322 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements

Brophy, John; Garner, Charles; July 11, 2006; 37 pp.; In English; AIAA Joint Propulsion Conference, 10-12 Jul. 2006, Sacramento, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39926>

The Dawn ion thrusters meet all of the performance and life requirements for the Dawn mission. FT001 has two magnets in sideways in the middle magnet ring, but this has only a minor impact on the thruster performance. Electron-backstreaming is the first wear-out failure mechanism for the Dawn ion thrusters - PFA Modeling Indicates: a) The mission cannot be completed with a single thruster; b) The probability for mission success based on accelerator grid wear is $\geq 99\%$ for the worst case thruster usage for nominal thruster beamlet profiles; and c) FT002 has the most peaked beam profile which impacts the thruster's throughput capability. PFA results indicate that this reduces the probability for mission success based on accelerator grid wear to 97% based on the worst case thruster usage. The wear-out probability is zero if all three thrusters are used during the mission.

Derived from text

Ion Engines; Mission Planning; Space Missions; Wear; Failure; Failure Analysis

20070012909 Air Force Research Lab., Hanscom AFB, MA USA

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model

Karabadzak, George F; Chiu, Yu-hui; Dressler, Rainer A; Jan 2006; 13 pp.; In English; Original contains color illustrations Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A463088; AFRL-VS-HA-TR-2007-1008; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463088>

A collisional radiative model is presented for analyzing the xenon-propelled Hall Thruster optical radiation based on

apparent electron and ion-impact emission cross sections associated with lines in the visible and near-infrared region of the spectrum. The emission cross sections of selected near-infrared emission lines are incorporated in a collisional-radiative model. The effect of Stepwise excitation via metastable states on the derived line intensities for emissions from XeI 5p56p(6p') levels is evaluated. Meanwhile, visible XeII emissions are shown to provide plasma densities at high electron temperature conditions. The electron temperature and spatial ion number density distribution were determined from the luminescence spectra measured in the discharge and plume near-field plasma of the Hall thruster, the TSNIMASH D-55 anode layer-thruster. The results are in good agreement with the probe measurement data and simulations reported in the literature for the same thruster. The analysis of the Hall thruster XeI near-infrared spectra demonstrates that the neglect of ion-atom collisions results in an erroneous electron temperature determination at electron temperatures below 10 eV.

DTIC

Collisions; Electric Propulsion; Hall Thrusters; Ion Emission; Optical Properties; Xenon

20070013549 NASA Johnson Space Center, Houston, TX, USA, United Space Alliance, Houston, TX, USA

Rendezvous and Proximity Operations of the Space Shuttle

Goodman, John L.; September 11, 2005; 17 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS9-20000; Copyright; Avail.: CASI: [A03](#), Hardcopy

Space Shuttle rendezvous missions presented unique challenges that were not fully recognized when the Shuttle was designed. Rendezvous targets could be passive (i.e., no lights or transponders), and not designed to facilitate Shuttle rendezvous, proximity operations and retrieval. Shuttle reaction control system jet plume impingement on target spacecraft presented induced dynamics, structural loading and contamination concerns. These issues, along with limited forward reaction control system propellant, drove a change from the Gemini/Apollo coelliptic profile heritage to a stable orbit profile, and the development of new proximity operations techniques. Multiple scientific and on-orbit servicing missions and crew exchange, assembly and replenishment flights to Mir and to the International Space Station drove further profile and piloting technique changes, including new relative navigation sensors and new computer generated piloting cues.

Author

Proximity; Space Shuttle Missions; Elliptical Orbits; Rendezvous Spacecraft

20070013742 NASA Marshall Space Flight Center, Huntsville, AL, USA

Solar Sail Model Validation from Echo Trajectories

Heaton, Andrew F.; Brickerhoff, Adam T.; January 27, 2007; 10 pp.; In English; AAS Spaceflight Mechanics Conference, 28-31 Jan. 2007, Sedona, AZ, USA; Copyright; Avail.: CASI: [A02](#), Hardcopy

The NASA In-Space Propulsion program has been engaged in a project to increase the technology readiness of solar sails. Recently, these efforts came to fruition in the form of several software tools to model solar sail guidance, navigation and control. Furthermore, solar sails are one of five technologies competing for the New Millennium Program Space Technology 9 flight demonstration mission. The historic Echo 1 and Echo 2 balloons were comprised of aluminized Mylar, which is the near-term material of choice for solar sails. Both spacecraft, but particularly Echo 2, were in low Earth orbits with characteristics similar to the proposed Space Technology 9 orbit. Therefore, the Echo balloons are excellent test cases for solar sail model validation. We present the results of studies of Echo trajectories that validate solar sail models of optics, solar radiation pressure, shape and low-thrust orbital dynamics.

Author

Solar Sails; Trajectories; Guidance (Motion); Aerospace Engineering; Low Earth Orbits; Navigation

23

CHEMISTRY AND MATERIALS (GENERAL)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 25 through 29*. For astrochemistry see category *90 Astrophysics*.

20070011516 Arnall Golden Gregory, LLP, Atlanta, GA, USA

Elongated Nano-Structures and Related Devices

Tsakalakos, L.; Lee, J. U.; Huber, W. H.; Corderman, R. R.; Mani, V.; 25 Nov 03; 12 pp.; In English

Contract(s)/Grant(s): NIST-70NANB2H3030

Patent Info.: Filed Filed 25 Nov 03; US-Patent-Appl-SN-10-722 700

Report No.(s): PB2007-101622; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In a method of making an elongated carbide nanostructure, a plurality of spatially-separated catalyst particles is applied to a substrate. The spatially-separated catalyst particles and at least a portion of the substrate are exposed to a metal-containing vapor at a preselected temperature and for a period sufficient to cause an inorganic nano-structure to form between the substrate and at least one of the catalyst particles. The inorganic nano-structure is exposed to a carbon-containing vapor source at a preselected temperature and for a period sufficient to carburize the inorganic nano-structure.

NTIS

Nanostructure (Characteristics); Elongation; Mechanical Devices

20070011521 Wilmer Cutler Pickering Hale and Dorr, LLP, Boston, MA, USA

Vapor Deposition of Silicon Dioxide Nanolaminates

Gordon, R. G.; Becker, J.; Hausmann, D.; 27 Sep 04; 26 pp.; In English

Contract(s)/Grant(s): NSF-ECS-9975504

Patent Info.: Filed Filed 27 Sep 04; US-Patent-Appl-SN-10-951 464

Report No.(s): PB2007-101644; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This invention relates to materials and processes for thin film deposition on solid substrates. Silica/alumina nanolaminates were deposited on heated substrates by the reaction of an aluminum-containing compound with a silanol. The nanolaminates have very uniform thickness and excellent step coverage in holes with aspect ratios over 40:1. The films are transparent and good electrical insulators. This invention also relates to materials and processes for producing improved porous dielectric materials used in the insulation of electrical conductors in microelectronic devices, particularly through materials and processes for producing semi-porous dielectric materials wherein surface porosity is significantly reduced or removed while internal porosity is preserved to maintain a desired low-k value for the overall dielectric material. The invention can also be used to selectively fill narrow trenches with low-k dielectric material while at the same time avoiding deposition of any dielectric on the surface area outside of the trenches.

NTIS

Silicon Dioxide; Vapor Deposition; Vapors; Laminates; Nanotechnology

20070011528 Environmental Protection Agency, Washington, DC, USA

National Environmental Laboratory Accreditation Conference. Constitution, Bylaws, and Standards Approved July 1998

Nov. 1998; 218 pp.; In English

Report No.(s): PB2007-107065; EPA/600/R-98/151; No Copyright; Avail.: CASI: [A10](#), Hardcopy

The National Environmental Laboratory Accreditation Conference (NELAC) is a voluntary association of State and Federal agencies with full opportunity for input from the private sector. NELAC's purpose is to adopt and promote mutually acceptable performance standards for the operation of environmental laboratories. The National Environmental Laboratory Accreditation Program (NELAP) is responsible for the evaluation of the accrediting authority programs.

NTIS

Certification; Conferences; Environmental Laboratories; Environmental Monitoring; Laboratories; Licensing

20070011537 General Electric Co., Niskayuna, NY, USA

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids

D Evelyn, M. P.; Narang, K. J.; Giddings, R. A.; Tysoe, A. A.; Lucek, J. W.; 10 Dec 04; 17 pp.; In English

Contract(s)/Grant(s): 70NANB9H3020

Patent Info.: Filed Filed 10 Dec 04; US-Patent-Appl-SN-11-010 139

Report No.(s): PB2007-103298; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A capsule for containing at least one reactant and a supercritical fluid in a substantially air-free environment under high pressure, high temperature processing conditions. The capsule includes a closed end, at least one wall adjoining the closed end and extending from the closed end; and a sealed end adjoining the at least one wall opposite the closed end. The at least one wall, closed end, and sealed end define a chamber therein for containing the reactant and a solvent that becomes a supercritical fluid at high temperatures and high pressures. The capsule is formed from a deformable material and is fluid impermeable and chemically inert with respect to the reactant and the supercritical fluid under processing conditions, which are generally above 5 kbar and 550 degrees C and, preferably, at pressures between 5 kbar and 80 kbar and temperatures between 550 degrees C

and about 1500 degrees C. The invention also includes methods of filling the capsule with the solvent and sealing the capsule, as well as an apparatus for sealing the capsule.

NTIS

High Pressure; High Temperature; Pressure Vessels; Supercritical Flow; Supercritical Fluids

20070011551 Transportation Research Board, Washington, DC, USA, National Center for Asphalt Technology, Auburn, AL, USA

Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three

Brown, E. R.; Hainin, M. R.; Cooley, A.; Hurley, G.; Sep. 2004; 47 pp.; In English

Report No.(s): PB2007-106700; NCHRP-68-V3; Copyright; Avail.: National Technical Information Service (NTIS)

The presence of water in a pavement is detrimental to its life. Therefore, in the construction of hot mix asphalt (HMA), it is important that there is adequate compaction so the initial permeability is low and there will not be any significant densification under traffic loading. Numerous studies have shown that, for dense-graded mixes, the initial in-place air void content should not be less than approximately 3 percent or greater than 8 percent. Low in-place air voids tend to result in rutting, bleeding, and shoving, while high in-place air voids allow air and water to penetrate into the pavement, leading to an increased potential for oxidation, water damage, raveling, and cracking. For many years it has been believed that high in the in-place air void content of dense graded mixes results in increased permeability of these pavements. During the 1960s, Zube reported that dense-graded pavements became excessively permeable at in-place air voids above 8 percent. This was later confirmed in the 1980s by Brown et al. However, recent experience with coarse-graded Superpave mixes has shown that the size and interconnectivity of air voids greatly influence permeability.

NTIS

Asphalt; Compacting; Military Operations; Permeability; Thickness; Voids

20070011555 Townsend and Townsend and Crew, LLP, San Francisco, CA, USA, California Univ., Berkeley, CA, USA

Shaped Nanocrystal Particles and Methods for Working the Same

Alivisatos, A. P.; Sher, E. C.; Manna, L.; 2 Nov 04; 26 pp.; In English

Contract(s)/Grant(s): DE-AC03-76SF000-98

Patent Info.: Filed Filed 2 Nov 04; US-Patent-Appl-SN-10-980 472

Report No.(s): PB2007-101596; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Shaped nanocrystal particles and methods for making shaped nanocrystal particles are disclosed. One embodiment includes a method for forming a branched, nanocrystal particle. It includes (a) forming a core having a first crystal structure in a solution, (b) forming a first arm extending from the core having a second crystal structure in the solution, and (c) forming a second arm extending from the core having the second crystal structure in the solution.

NTIS

Nanocrystals; Particle Theory

20070011559 Greenlee Winner and Sullivan, P.C., Boulder, CA, USA

Nanostructured Magnetorheological Fluids and Gels

Fuchs, A.; Gordaninejad, F.; Hu, B.; Kavlicoglu, B.; 9 Aug 04; 23 pp.; In English

Contract(s)/Grant(s): DAAD 19-01-1-0614

Patent Info.: Filed Filed 9 Aug 04; US-Patent-Appl-SN-10-915 257

Report No.(s): PB2007-101604; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Magnetorheological materials having a supramolecular polymer gel as a component of the carrier are disclosed. Useful supramolecular polymers for gels include those having terpyridine ligands which can participate in metal coordination bonding. The magnetizable particles of magnetorheological materials can have supramolecular surfactant-polymer coatings.

NTIS

Gels; Magnetorheological Fluids; Nanofabrication

20070011578 Desert Research Inst., Reno, NV, USA

Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area

Fujita, E. M.; Campbell, D. E.; Zielinska, B.; Dec. 21, 2006; 62 pp.; In English

Contract(s)/Grant(s): ACI-5-55528-01; E-96-A

Report No.(s): PB2007-106972; CRC-E-69-A; No Copyright; Avail.: National Technical Information Service (NTIS)

This study compares the chemical composition of lubrication oils with corresponding composition of exhaust PM emissions obtained during the Kansas City Light Duty Vehicle Emissions Characterization Study. This test fleet consisted of 480 randomly selected, light-duty vehicles in the Kansas City Metropolitan Area. The study was conducted during July to September 2004 (summer/Round 1) and January to March 2005 (winter/Round 2). All vehicles were tested using the Unified Driving Cycle (UDC). A total of 26 individual/composite chemical profiles were obtained from 51 of 254 vehicles tested in Round 1 and another 26 composites from 51 of 230 vehicles tested in Round 2. Organic speciation included semi-volatile and particle phase polycyclic aromatic hydrocarbons (PAHs), alkanes, hopanes and steranes, nitro-PAHs and polar compounds. Samples of the lubricating oil from each of the test vehicles were collected and stored for future analysis. We analyzed a subset of 15 used oil samples, combined into 9 composites, and three unused oils. Correlations of emissions of hopanes and steranes with organic carbon and PM emissions indicated that the organic fraction of particulate matter (PM) emissions of high emitters were associated mainly with consumption of lubricating oils. The rates of oil consumption were estimated from the exhaust emissions of hopanes and abundances of hopanes in the corresponding lubricating oil. Based upon consumption rates estimated from the correlation and chemical composition of the oils, we determined that the contributions of PAHs that were absorbed in the lubricating oil to PAHs in exhaust emissions were small. This limited dataset indicate that fuel-combustion was the primary source of PAHs.

NTIS

Alkanes; Characterization; Chemical Analysis; Cities; Combustion Products; Exhaust Emission; Exhaust Gases; Gasoline; Hydrocarbons; Lubrication; Oils; Particulates

20070011599 Fish and Richardson, P.C., Dallas, TX, USA

Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids

Lewis, N. S.; Grubbs, R. H.; Tillman, E. S.; Koscho, M. E.; 18 Nov 03; 36 pp.; In English

Contract(s)/Grant(s): DAAG-55-98-1-0266; R 01 CD04712-02

Patent Info.: Filed Filed 18 Nov 03; US-Patent-Appl-SN-10-980 901

Report No.(s): PB2007-103279; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Provided are sensors, sensor arrays, and systems for detecting an analyte. A sensor provided by the disclosure comprises an amine-containing material. Such sensors are useful to detect carboxylic-containing analytes such as fatty acids.

NTIS

Carbon; Composite Materials; Fatty Acids; Sensitivity; Vapors; Detection; Remote Sensors

20070011600 Army Soldier and Biological Chemical Command, Natick, MA, USA

Enzymatic Template Polymerization

Samuelson, L. A.; Bruno, F.; Tripathy, S. K.; Nagarajan, R.; Kumar, J.; 5 Oct 04; 25 pp.; In English

Contract(s)/Grant(s): DAAH04-94-2-003

Patent Info.: Filed Filed 5 Oct 04; US-Patent-Appl-SN-10-962 816

Report No.(s): PB2007-103238; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A conductive polymer is formed enzymatically in the presence of a polynucleotide template. The method includes combining at least one redox monomer with a polynucleotide template and a redox enzyme, such as horseradish peroxidase, to form a reaction mixture. The monomer aligns along the template before or during the polymerization. Therefore, the polynucleotide template thereby affects the molecular weight and conformation of the conductive polymer. When the conductive polymer is complexed to a polynucleotide duplex, the conformation of the polynucleotide duplex can be modulated by changing the oxidation state of the conductive polymer.

NTIS

Enzyme Activity; Enzymes; Polymerization; Templates

20070012570 Environmental Protection Agency, Washington, DC USA

Liquid Crystal Polymers as a Machine Fluid (on CD-ROM)

Jun. 2003; In English

Report No.(s): PB2007-500014; No Copyright; Avail.: National Technical Information Service (NTIS)

This interactive CD-ROM was produced to present the science, research activities, and beneficial environmental and machining advantages for utilizing Liquid Crystal Polymers (LCPs) as a machine fluid in the manufacturing industry. In 1995, the U.S. EPA funded a project to cut fluids in metal machining operations. As a result, a guide was developed for the selection

and use of metal working fluids based on alloy, shape, tool size, and machining speed. This project evaluated a unique metal working fluid known as LCP. LCP fluids are a new class of polymers that are non-toxic; physiologically inert; not attacked or biodegraded by bacteria or fungi; have a boiling point greater than 550F; are stable in the presence of oxidizing agents; are un-reactive with acids and alkaline solutions; are transparent; immiscible with water and aqueous mixtures; less dense than water, therefore float as a separate layer in aqueous systems; and have very low pressure at ambient and near ambient temperatures.

NTIS

CD-ROM; Liquid Crystals

20070012727 Southwest Research Inst., San Antonio, TX USA

Method for Testing Properties of Corrosive Lubricants

Ohl, J.; De La Cruz, J. L.; Lacey, P. I.; 25 Nov 03; 13 pp.; In English

Contract(s)/Grant(s): NREL-YXE-8-18033-01

Patent Info.: Filed 25 Nov 03; US-Patent-Appl-SN-10-721-305

Report No.(s): PB2007-101593; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This document shows a method of testing corrosive lubricating media using a wear testing apparatus without a mechanical seal. The wear testing apparatus and methods are effective for testing volatile corrosive lubricating media under pressure and at high temperatures.

NTIS

Corrosion; Corrosion Prevention; Lubricants

20070012845 Air Force Research Lab., Wright-Patterson AFB, OH USA

Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces

Slocik, Joseph M; Beckel, Eric R; Jiang, Hao; Enlow, Jesse O; Zabinsky, Jr, Jeffrey S; Bunning, Timothy J; Naika, Rajesh R; Jan 2006; 17 pp.; In English

Contract(s)/Grant(s): Proj-M08R

Report No.(s): AD-A462971; AFRL-ML-WP-TP-2006-471; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462971>

Micropatterned surfaces have received extensive attention for possible applications in advanced technologies including microelectronics, microfluidics, cell growth confinement and biosensor fabrication. The latter two applications exemplify the increasing coordination between materials science and biology for future generation advanced materials. Plasma-enhanced chemical vapor deposition (PECVD) shows great promise for strengthening this aforementioned materials science and biology intersection. PECVD provides an excellent generalized platform for the incorporation of a wealth of different biomolecules and/or biologically inspired materials by way of micropatterned structures. Micropatterned substrates with site-specific binding were developed by way of self-assembled monolayer chemistry in conjunction with thin layer organic polymer deposition via PECVD. Spatial binding of biomolecules and quantum dots to PECVD patterned substrates are demonstrated.

DTIC

Biochemistry; Plasmas (Physics); Vapor Deposition

20070012920 Belgrade Univ., Macedonia

Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent

Sullivan, Patrick D; Wander, Joseph D; Newsome, Kolin C; Petkovska, Menka; Antov-Bozalo, Danijela; Markovic, Ana; Dec 2006; 65 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-04-1-3053; Proj-4918

Report No.(s): AD-A463107; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463107>

The use of activated carbon fabrics (ACFs) that are desorbed electrothermally, also known as the Joule effect, is explored as a potential method to create a regenerating chemical warfare agent (CWA) filter. Electrical resistance vs. temperature measurements are presented for kynol-based ACF and compared with results for ACFs produced from other substrates. Adsorption and desorption results for dimethyl-methylphosphonate (DMMP) demonstrate that organophosphate compounds can be effectively desorbed from ACF. Chloroethane and propane are used to simulate the behavior of low-molecular-weight CWAs. Results for these more weakly adsorbed simulants indicate that a system that could indefinitely reject HCN without

impregnants may be feasible. Planned efforts to advance this technology by both experimentation and modeling are discussed.
DTIC

Activated Carbon; Adsorbents; Adsorption; Carbon Fibers; Masks; Mathematical Models

20070012972 Army Research Lab., Aberdeen Proving Ground, MD USA

FPI and MPI of Cracks Under Coatings

Grendahl, Scott; Hardisky, Benjamin; Jan 2007; 72 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463320; ARL-TR-4033; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463320>

The U.S. Army Aviation and Missile Research Development and Engineering Center requested that the U.S. Army Research Laboratory develop and execute a program designed to evaluate the performance of nondestructive inspection (NDI) techniques over typical army aviation paint systems. Corpus Christi Army Depot performs the majority of the current maintenance and overhaul operations on army aviation systems. This facility would greatly benefit in throughput and in reduction of hazardous waste generated if the removal of the applied coating systems could be avoided. The objective of this work was to evaluate the effect of not removing the most common currently approved aviation coating system on the NDI cycles. The test plan and methodology was created in conjunction with and approved through AMSRD-AMR-AE-F-M.

DTIC

Coatings; Crack Propagation; Cracks

20070013159 Academy of Sciences of the Ukraine, Kiev, Ukraine

International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006

Vertsimakha, Ya; Sep 29, 2006; 215 pp.; In English

Contract(s)/Grant(s): FA8655-06-1-5067

Report No.(s): AD-A463192; No Copyright; Avail.: CASI: [A10](#), Hardcopy

The Final Proceedings for 6th International Conference 'Electronic Processes in Organic Materials', 25-29 September 2006. This conference will cover the following topics: 1. Energy structure of organic materials and electronic processes in organic compounds 2. Electronic processes at interfaces of organic materials to metals, as well as biological, organic, inorganic media and nanostructures 3. Electro-optic processes in confined liquid crystals 4. Nonlinear properties of organic structures and composites 5. Electronic processes within polymer composites 6. Nanostructures. Polymer and hybrid nanophotonics 7. Novel organic materials and technologies for technical application and medicine 8. Physical aspects of composites and biological materials application. DNA and polymeric based bio photonics.

DTIC

Abstracts; Conferences; Organic Materials; Ukraine

20070013326 Georgia Tech Research Inst., Atlanta, GA USA

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography

King, William P; Sep 30, 2006; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-06-1-0005

Report No.(s): AD-A463608; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This one-year feasibility study explored the use of thermal dip-pen nanolithography (DPN) for the purpose of nanoscale electronics manufacturing. In this project, we have demonstrated that using the thermal DPN technique that both indium metal, and semiconducting organic materials (PDDT, PVDF) can be written in arbitrary locations on semiconductor surfaces with sub-100 nm feature sizes. We have measured the electrical properties of these nanostructure deposits and found them to be electrically functional. This accomplishment opens new opportunities for nanoelectronics manufacture and repair, where a functional deposit of an electronic material can be deposited in an arbitrary single location. Thus we can report success in this feasibility study.

DTIC

Electrical Properties; Electro-Optics; Feasibility; Lithography; Nanofabrication; Nanostructures (Devices); Nanotechnology; Organic Materials; Semiconductors (Materials)

20070013470 Lawrence Livermore National Lab., Livermore, CA USA

MOSSFRAC: An Anisotropic 3D Fracture Model

Moss, W. C.; Levatin, J. L.; Aug. 2006; 9 pp.; In English

Report No.(s): DE2006-894759; UCRL-TR-223712; No Copyright; Avail.: National Technical Information Service (NTIS)

Despite the intense effort for nearly half a century to construct detailed numerical models of plastic flow and plastic damage accumulation, models for describing fracture, an equally important damage mechanism still cannot describe basic fracture phenomena. Typical fracture models set the stress tensor to zero for tensile fracture and set the deviatoric stress tensor to zero for compressive fracture. One consequence is that the simple case of the tensile fracture of a cylinder under combined compressive radial and tensile axial loads is not modeled correctly. The experimental result is a cylinder that can support compressive radial loads, but no axial load, whereas, the typical numerical result is a cylinder with all stresses equal to zero. This incorrect modeling of fracture locally also has a global effect, because material that is fracturing produces stress release waves, which propagate from the fracture and influence the surrounding material. Consequently, it would be useful to have a model that can describe the stress relief and the resulting anisotropy due to fracture. MOSSFRAC is a material model that simulates three-dimensional tensile and shear fracture in initially isotropic elastic-plastic materials, although its framework is also amenable to initially anisotropic materials.

NTIS

Anisotropy; Fracture Mechanics; Fracturing; Three Dimensional Models

20070013476 Georgia Tech Research Inst., Atlanta, GA, USA, Mississippi State Univ., Mississippi State, MS, USA, Mississippi State Univ., Mississippi State, MS, USA, Sandia National Labs., Livermore, CA, USA

Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS

Gall, K.; McDowell, D. L.; Diao, J.; Dunn, M. L.; Miller, D. C.; Oct. 2006; 119 pp.; In English

Report No.(s): DE2006-894747; No Copyright; Avail.: National Technical Information Service (NTIS)

Lightweight and miniaturized weapon systems are driving the use of new materials in design such as microscale materials and ultra low-density metallic materials. Reliable design of future weapon components and systems demands a thorough understanding of the deformation modes in these materials that comprise the components and a robust methodology to predict their performance during service or storage. Traditional continuum models of material deformation and failure are not easily extended to these new materials unless microstructural characteristics are included in the formulation. For example, in LIGA Ni and Al-Si thin films, the physical size is on the order of microns, a scale approaching key microstructural features. For a new potential structural material, cast Mg offers a high stiffness-to-weight ratio, but the microstructural heterogeneity at various scales requires a structure-property continuum model. Processes occurring at the nanoscale and microscale develop certain structures that drive material behavior. The objective of the work presented in this report was to understand material characteristics in relation to mechanical properties at the nanoscale and microscale in these promising new material systems. Research was conducted primarily at the University of Colorado at Boulder to employ tightly coupled experimentation and simulation to study damage at various material size scales under monotonic and cyclic loading conditions.

NTIS

Fatigue (Materials); Magnesium; Microelectromechanical Systems; Nanowires; Quantum Wires; Mathematical Models

20070013480 Savannah River National Lab., Aiken, SC, USA

Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing

Korinko, P. S.; Arnold, K. F.; Sep. 2006; 34 pp.; In English

Report No.(s): DE2006-894728; WSRC-STI-2006-00158-REV-1; No Copyright; Avail.: National Technical Information Service (NTIS)

A statistically designed experiment was conducted as part of a six sigma project for Fill Stem Manufacturing and Pinch Weld Processing. This multi-year/multi-site project has successfully completed a screening study and used those results as inputs to this optimization study. Eleven welds were made using fairly tight current and cycle range. The welds demonstrate increased burst strength, longer closure length, more net displacement, and improved bond rating with increased current. However, excessive melting remains a concern from a processing viewpoint and may cause adverse metallurgical interactions. Therefore, the highest current levels specified cannot be utilized. A Validation Study is proposed for the Defense Programs Inert Facility.

NTIS

Manufacturing; Welded Joints; Optimization; Mechanical Properties

20070013506 Wong, Cabello, Lutsch, Rutherford and Brucculeri, Houston, TX, USA

Purification of Carboxylic Acids by Complexation with Selective Solvents

Wytcherley, R. W.; Chou, T. L.; 8 Apr 05; 10 pp.; In English

Contract(s)/Grant(s): DE-FC36-01 LD14085

Patent Info.: Filed Filed 8 Apr 05; US-Patent-Appl-SN-11-102-242

Report No.(s): PB2007-105929; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A method and apparatus for purifying carboxylic acids is disclosed. A mixture containing crude carboxylic acid is contacted with a selective crystallization solvent to form a slurry of a salt complex of the carboxylic acid and the selective crystallization solvent. The salt complex is recovered and optionally processed to recover the free carboxylic acid. The method and apparatus of the invention is particularly suitable for purifying aromatic dicarboxylic acids such as terephthalic acid. The present invention also reduces contamination by carboxybenzaldehyde isomers in crude phthalic acids by oxidizing the carboxybenzaldehyde to the corresponding phthalic acid.

NTIS

Carboxylic Acids; Purification; Solvents

20070013535 Carlson, Gaskey and Olds, P.C., Birmingham, MI, USA

Low Leakage Finger Seal

Farah, J.; Newell, L.; Kehret, D.; 2 Mar 05; 7 pp.; In English

Contract(s)/Grant(s): NV-N00019-02-C-3003

Patent Info.: Filed Filed 2 Mar 05; US-Patent-Appl-SN-11-070-453

Report No.(s): PB2007-101685; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A seal for an exhaust duct includes a metal mesh member sandwiched between an outer plate and an inner plate. The seal includes a plurality of flexible members defined by a plurality of slots in both the inner and outer plates. The flexible members provide for expansion and contraction along with creating flexibility in the region of contact between the seal land and the seal. The metal mesh member substantially eliminates gaps and leak paths created through the slots. The metal mesh member is composed of a plurality of interwoven wire strands impregnated with a high temperature elastomeric sealant. The impregnation of high temperature elastomeric sealant over the metal mesh member improves sealing while maintaining the desired flexibility of the seal.

NTIS

Leakage; Sealers; Ducts; Exhaust Systems

20070013562 University of South Florida, Tampa, FL, USA

Silver Crystals Through Tollen's Reaction

Ding, X.; Fries, D.; 14 Jan 05; 9 pp.; In English

Contract(s)/Grant(s): DASG60-00-C-0089

Patent Info.: Filed Filed 14 Jan 05; US-Patent-Appl-SN-10-905-658

Report No.(s): PB2007-105957; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A method for the formation of regular-shaped silver crystals through a wet chemical reaction (Tollen's reaction) is presented. The growth of the Ag crystals (size, morphology and aggregation) can be controlled via adjusting reaction conditions such as temperature and reducing agent concentrations before and during the reactions. The smaller Ag crystals (50-200 nm) were generated under the condition of limited reductive reagent (glucose), and the larger silver crystals (about 500-1000 nm) were the aggregated silver nano-particles (100-200 nm) produced at higher reducing agent concentrations. Most of the larger crystals were in the shape of cube or rectangular cube, and rarely, they were in clusters. The smaller crystals (aggregation of Ag atoms) were shaped in cube or/and cone, and both single crystals and clusters were formed. The presence of impurity (TiO₂ nano-particles, 25-50 nm) as crystal seeds enables the 3-D growth of large, irregular-shaped Ag clusters (about 500-1000 nm).

NTIS

Crystals; Patent Applications; Silver

20070013564 California Inst. of Tech., Pasadena, CA USA, California Univ., Oakland, CA, USA

High Throughput Screening of Crystallization of Materials

Quake, S. R.; Hansen, C. L.; Berger, J. M.; 23 May 05; 63 pp.; In English

Contract(s)/Grant(s): NIH-HG-01642-02

Patent Info.: Filed Filed 23 May 05; US-Patent-Appl-SN-11-135-923

Report No.(s): PB2007-105955; No Copyright; Avail.: CASI: [A04](#), Hardcopy

High throughput screening of crystallization of a target material is accomplished by simultaneously introducing a solution of the target material into a plurality of chambers of a microfabricated fluidic device. The microfabricated fluidic device is then

manipulated to vary the solution condition in the chambers, thereby simultaneously providing a large number of crystallization environments. Control over changed solution conditions may result from a variety of techniques, including but not limited to metering volumes of crystallizing agent into the chamber by volume exclusion, by entrapment of volumes of crystallizing agent determined by the dimensions of the microfabricated structure, or by cross-channel injection of sample and crystallizing agent into an array of junctions defined by intersecting orthogonal flow channels.

NTIS

Crystallization; Patent Applications

20070013568 California Univ., Berkeley, CA, USA

Accelerating the Discovery of Effective Photonic Reagents

Rabitz, H.; 11 Mar 05; 25 pp.; In English

Contract(s)/Grant(s): NSF-CHE-0107803; NSF-ARO-MURI

Patent Info.: Filed Filed 11 Mar 05; US-Patent-Appl-SN-11-078-792

Report No.(s): PB2007-105947; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method for accelerating searches for optimal control of photonic reagents is provided. Closed loop feedback is applied to control a quantum system. A direct search deterministic technique is used for refining said closed loop feedback control. A quantum system controller is also provided.

NTIS

Reagents; Photonics; Searching; Optimal Control

20070013570 Intellectual Property/Technology Law, Research Triangle Park, NC, USA

Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems

Dimeo, F.; Chen, P. S. H.; Neuner, J. W.; Welch, J.; Stawasz, M.; 14 Feb 05; 35 pp.; In English

Contract(s)/Grant(s): NIST-70NANB9H3018

Patent Info.: Filed Filed 14 Feb 05; US-Patent-Appl-SN-11-057-735

Report No.(s): PB2007-105945; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A gas detector and process for detecting a fluorine-containing species in a gas containing same, e.g., an effluent of a semiconductor processing tool undergoing etch cleaning with HF, NF.sub.3, etc. The detector in a preferred structural arrangement employs a microelectromechanical system (MEMS)-based device structure and/or a free-standing metal element that functions as a sensing component and optionally as a heat source when elevated temperature sensing is required. The free-standing metal element can be fabricated directly onto a standard chip carrier/device package so that the package becomes a platform of the detector.

NTIS

Fluoro Compounds; Semiconductors (Materials); Chemical Detection; Gas Detectors

20070013575 Air Liquide, Houston, TX, USA

Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles

Kulkarni, S. S.; Ekiner, O. M.; Hasse, D. J.; 28 Mar 05; 9 pp.; In English

Patent Info.: Filed Filed 28 Mar 05; US-Patent-Appl-SN-11-091-156

Report No.(s): PB2007-105942; No Copyright; Avail.: CASI: [A02](#), Hardcopy

This abstract discusses producing mixed matrix composite (MMC) membranes with a good balance of permeability and selectivity. MMC membranes are particularly needed for separating fluids in oxygen/nitrogen separation processes, processes for removing carbon dioxide from hydrocarbons or nitrogen, and the separation of hydrogen from petrochemical and oil refining streams. MMC Membranes made using washed sieve material, such as washed SSZ-13 sieve material, provide surprisingly good permeability and selectivity. The method of the current invention produces a fluid separation membrane by providing a polymer and a washed molecular sieve material, then synthesizing a concentrated suspension of a solvent, the polymer, and the washed molecular sieve material. The concentrated suspension is used to form the fluid separation membrane of the desired configuration. Membranes of the current invention can be formed into hollow fiber membranes that are particularly suitable for high trans-membrane pressure applications.

NTIS

Absorbents; Membranes; Permeability; Matrix Materials

20070013636 Hodgson Russ LLP, Buffalo, NY, USA

Compositions and Methods for Less Immunogenic Protein Formulations

Balasubramanian, S. V.; Straubinger, R. M.; Purohit, V. S.; Ramani, K.; 2 Feb 05; 21 pp.; In English

Contract(s)/Grant(s): NIH-RO1HL-70227-01

Patent Info.: Filed Filed 2 Feb 05; US-Patent-Appl-SN-11-049-134

Report No.(s): PB2007-105940; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods and composition are described for low immunogenic protein, polypeptide or peptide formulations. The method comprises forming complexes of the protein, polypeptide or peptide with a binding agent which can be a serine containing compound or other phosphatidyl compounds or phospholipids. The complexes formed include simple complexes, micelles, cochleate structures, liposomes, non-bilayer and novel lipidic structures. The antigenicity and immunogenicity of the protein, polypeptides or peptides is reduced upon formation of such complexes.

NTIS

Patent Applications; Proteins

20070013637 Minnesota Univ., Minneapolis, MN, USA

Protein Microarray System

Lubman, D. M.; Chinniyar, A. M.; Pal, M.; Sreekumar, A.; Ethier, S. P.; 30 Mar 05; 76 pp.; In English

Contract(s)/Grant(s): NIH-P50 CA 69568; NIH-CA049500

Patent Info.: Filed Filed 30 Mar 05; US-Patent-Appl-SN-11-094-590

Report No.(s): PB2007-105941; No Copyright; Avail.: CASI: [A05](#), Hardcopy

The present invention relates to automated methods, systems, and apparatuses for protein separation and analysis. In particular, the present invention provides an automated system for the separation, identification, and characterization of the phosphorylation status of protein samples, including the generation and analysis of protein microarrays.

NTIS

Patent Applications; Proteins

20070013639 Morrison and Foerster LLP, Palo Alto, CA, USA

Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor

Lin, X.; 13 Dec 04; 20 pp.; In English

Contract(s)/Grant(s): NIH-CA102181

Patent Info.: Filed Filed 13 Dec 04; US-Patent-Appl-SN-11-011-406

Report No.(s): PB2007-105939; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods of producing properly folded recombinant VEGF polypeptide are provided. Denatured recombinant VEGF polypeptide is refolded by first solubilizing the polypeptide with a chaotroph at high pH, followed by refolding in the presence of reduced concentrations of chaotroph and in the presence of a detergent while the pH is slowly reduced.

NTIS

Cardiovascular System; Cell Division; Inhibitors; Patent Applications

20070013640 Fish and Richardson, San Diego, CA, USA

Trihydroxy Polyunsaturated Eicosanoid Derivatives

Petasis, N. A.; 29 Mar 05; 28 pp.; In English

Contract(s)/Grant(s): NIH-PO1-DE1 3499

Patent Info.: Filed Filed 29 Mar 05; US-Patent-Appl-SN-11-093-757

Report No.(s): PB2007-105931; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The invention features methods for the preparation of naturally occurring trihydroxy polyunsaturated eicosanoids and their structural analogs. The invention further provides new derivatives and analogs of trihydroxy polyunsaturated eicosanoids that can be prepared according to these methods. The invention also provides compositions and methods using trihydroxy polyunsaturated eicosanoid derivatives for the prevention, amelioration and treatment of a variety of diseases or conditions associated with inflammation or inflammatory response, autoimmune diseases, rheumatoid arthritis, cardiovascular diseases, or abnormal cell proliferation or cancer.

NTIS

Derivation; Patent Applications

24
COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

20070011454 NASA Glenn Research Center, Cleveland, OH, USA

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II

Chuang, Kathy C.; Criss, Jim M.; Mintz, Eric A.; Scheiman, Daniel A.; Nguyen, Baochau N.; McCorkle, Linda S.; [2007]; 10 pp.; In English; High Temple Workshop 2007 University of Dayton Research Institute, 12-15 Feb. 2007, Sedona, AZ, USA; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011454>

A series of polyimide resins with low-melt viscosities in the range of 10-30 poise and high glass transition temperatures (T_g s) of 330-370 C were developed for resin transfer molding (RTM) applications. These polyimide resins were formulated from 2,3,3',4'-biphenyltetracarboxylic dianhydride (a-BPDA) with 4-phenylethynylphthalic anhydride endcaps along with either 3,4'-oxyaniline (3,4'-ODA), 3,4'-methylenedianiline, (3,4'-MDA) or 3,3'-methylenedianiline (3,3'-MDA). These polyimides had pot lives of 30-60 minutes at 260-280 C, enabling the successful fabrication of T650-35 carbon fiber reinforced composites via RTM process. The viscosity profiles of the polyimide resins and the mechanical properties of the polyimide carbon fiber composites will be discussed.

Author

Polyimide Resins; Glass Transition Temperature; Fiber Composites; Viscosity; Resin Transfer Molding; High Temperature; Carbon Fibers

20070011534 Saliwanchik Lloyd and Saliwanchik, Gainesville, FL, USA

Fibrous Minerals Methods for Their Production Using a Solution-Precursor-Solid Mechanism and Methods and Use

Gower, L. B.; Olszta, M. J.; 5 Apr 04; 18 pp.; In English

Contract(s)/Grant(s): ECS-9986333

Patent Info.: Filed 5 Apr 04; US-Patent-Appl-SN-10-819 040

Report No.(s): PB2007-103319; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention pertains to mineral fibers useful as biomimetics of tissue, such as dental enamel and bone, and as filler in paper, paint, coatings, and plastic production. The present invention also concerns methods for producing mineral fibers by contacting an inorganic liquid-phase mineral precursor with a crystalline inorganic substrate under conditions permitting the inorganic liquid-phase mineral precursor to solidify and crystallize, compositions comprising mineral fibers, and methods for treating a tissue defect within a patient by applying mineral fibers to the site of the tissue defect.

NTIS

Minerals; Patent Applications

20070011548 Missouri Univ., Rolla, MO, USA

Strengthening of Rural Bridges Using Rapid-Installation FRP Technology

Rizzo, A.; Galati, N.; Nanni, A.; Jan. 2007; 311 pp.; In English

Report No.(s): PB2007-103390; UTC-R-135; No Copyright; Avail.: National Technical Information Service (NTIS)

Three bridges were strengthened using an innovative method developed at University of Missouri Rolla. It consists of strengthening reinforced concrete members using Fiber Reinforced Polymer (FRP) laminates, having high bearing and longitudinal strengths, mechanically fastened to concrete elements using wedge anchors spaced in a proper pattern. It results rapid and uses conventional typically available hand-tools, lightweight materials and unskilled labor. The three bridges are No. 1330005, No. 3855006 and No. 2210010. Bridge No. 3855006 was originally constructed in 1976 while the year built is not known for the other two bridges.

NTIS

Fiber Composites; Installing; Laminates; Bridges (Structures)

20070011560 Alabama Univ., Birmingham, AL, USA, Alabama Univ., Birmingham, AL, USA

Design and Analysis of Thermoplastic Composite Bridge Superstructures

Uddin, N.; Abro, A. M.; Vaidya, U.; Jan. 2007; 28 pp.; In English

Report No.(s): PB2007-105591; No Copyright; Avail.: National Technical Information Service (NTIS)

This study is primarily focused on addressing the application of fiber reinforced composites (thermoplastics) in the design

of bridge decks. Bridges are vital components of the nation's infrastructure, many of which are deteriorated. The replacement of such bridges requires careful planning as well as exploration of other materials that will resist the factors leading to the deterioration of old bridges, which in many cases need to be replaced before reaching 50 percent of their expected service life. In this study we present an integral modular fiber thermoplastic composite bridge structural system. The design concept is presented by utilizing high performance thermoplastic material (i.e. Glass/Polypropylene) along with an efficient low cost manufacturing process and fabrication technique. The design is based on detailed finite element analyses and limited experiments to investigate the stiffness and strength of the structural system. To demonstrate the design concept, two bridge deck systems with different spans were modeled and compared with two current thermoset composite bridge systems. The proposed design concepts for both decks present a unique approach for structurally efficient and low cost bridge deck systems. NTIS

Design Analysis; Fiber Composites; Thermoplastic Resins; Thermoplasticity

20070011613 NASA Johnson Space Center, Houston, TX, USA

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels

Greene, Nathanael; Yoder, Tommy; Saulsberry, Regor; Grimes, Lorie; Thesken, John; Phoenix, Leigh; [2007]; 4 pp.; In English; 48th AIAA/ASME/ASCE/AHS/ASC Structures, 23-26 Apr. 2007, Honolulu, HI, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Carbon composite overwrapped pressure vessels (COPVs) are widely used in applications from spacecraft to life support. COPV technology provides a pressurized media storage advantage over amorphous technology with weight savings on the order of 30 percent. The National Aeronautics and Space Administration (NASA) has been supporting the development of this technology since the early 1970's with an interest in safe application of these components to reduce mass to orbit. NASA White Sands Test Facility (WSTF) has been testing components in support of this objective since the 1980s and has been involved in test development and analysis to address affects of impact, propellant and cryogenic fluids exposure on Kevlar and carbon epoxy. The focus of this paper is to present results of a recent joint WSTF-Jet Propulsion Laboratories (JPL) effort to assess safe life of these components. The WSTF-JPL test articles consisted of an aluminum liner and a carbon fiber overwrap in an industry standard epoxy resin system. The vessels were specifically designed with one plus-minus helical wrap and one hoop wrap over the helical and they measured 4.23 x 11.4 in. long. 120 test articles were manufactured in August of 1998 of one lot fiber and resin and the 110 test articles were delivered to WSTF for test. Ten of the 120 test articles were burst tested at the manufacturer to establish the delivered fiber stress. Figure 1 shows a test article in a pre burst condition and with a hoop fiber failure (no leak of pressurized media) and post burst (failure of liner and loss of pressurized media).

Author

Carbon-Carbon Composites; Composite Wrapping; Linings; Pressure Vessels; Stress Analysis; Rupturing; Structural Strain

20070011614 NASA Johnson Space Center, Houston, TX, USA

Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels

Greene, Nathanael; Saulsberry, Regor; Yoder, Tommy; Forsyth, Brad; Thesken, John; Phoenix, Leigh; [2007]; 4 pp.; In English; 48th AIAA/ASME/ASCE/AHS/ASC Structures, 23-26 Apr. 2007, Honolulu, HI, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Many decades ago NASA identified a need for low-mass pressure vessels for carrying various fluids aboard rockets, spacecraft, and satellites. A pressure vessel design known as the composite overwrapped pressure vessel (COPV) was identified to provide a weight savings over traditional single-material pressure vessels typically made of metal and this technology has been in use for space flight applications since the 1970's. A typical vessel design consisted of a thin liner material, typically a metal, overwrapped with a continuous fiber yarn impregnated with epoxy. Most designs were such that the overwrapped fiber would carry a majority of load at normal operating pressures. The weight advantage for a COPV versus a traditional singlematerial pressure vessel contributed to widespread use of COPVs by NASA, the military, and industry. This technology is currently used for personal breathing supply storage, fuel storage for auto and mass transport vehicles and for various space flight and aircraft applications. The NASA Engineering and Safety Center (NESC) was recently asked to review the operation of Kevlar 2 and carbon COPVs to ensure they are safely operated on NASA space flight vehicles. A request was made to evaluate the life remaining on the Kevlar COPVs used on the Space Shuttle for helium and nitrogen storage. This paper provides a review of Kevlar COPV testing relevant to the NESC assessment. Also discussed are some key findings, observations, and recommendations that may be applicable to the COPV user community. Questions raised during the investigations have revealed the need for testing to better understand the stress rupture life and age life of COPVs. The focus of this paper is to describe burst testing of Kevlar COPVs that has been completed as a part of an the effort to evaluate the effects of ageing and shelf life on full scale COPVs. The test articles evaluated in this discussion had a diameter of 22 inches

for S/N 014 and 40 inches for S/N 011. The time between manufacture and burst was 28 and 22 years. Visual inspection, shearography, heat soak thermography and borescope inspection were performed on vessel S/N 011 and all but shearography was performed on S/N 014 before they were tested and details of this work can be found in a companion paper titled, 'Nondestructive Methods and Special Test Instrumentation Supporting NASA Composite Overwrapped Pressure Vessel Assessments.' The vessels were instrumented so that measurements could be made to aid in the understanding of vessel response. Measurements made on the test articles included girth, boss displacement, internal volume, multiple point strain, full field strain, eddy current, acoustic emission (AE) pressure and temperature. The test article before and during burst is shown with the pattern used for digital image correlation full field strain measurement blurring as the vessel fails.

Author

Composite Wrapping; Filament Winding; Kevlar (Trademark); Pressure Vessel Design; Pressure Vessels; Burst Tests; Linings

20070013176 Technische Univ., Chemnitz, Germany

Durable Wood Composites for Naval Low-Rise Buildings

Wolcott, Michael P; Pierre-Laborie, Marie; Smith, Paul; Damohapatra, Sudipta; McDonald, Armando; Yang, Han-Seung; Chowdhury, Sudip; Yadama, Vikram; McGraw, Daniel; Smith, Timothy; Jan 2007; 765 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0949

Report No.(s): AD-A463226; No Copyright; Avail.: Defense Technical Information Center (DTIC)

SIDING and TRIM COMPONENTS: Task S1 - Evaluate the durability perceptions, WPC substitution potential, and reasons for adopting (purchasing & carrying) new building materials from key members of the value chain (building material wholesalers and retailers). Task S2 - Examine the value propositions for specific residential siding and siding accessories and OSB products from the perspective of the manufacturer and key channel members. Task S3 - Evaluation of interactions between coupling agent, wood fiber and polymer matrix with solid state NMR. Task S4 - Development of finishes for wood/plastic composites. Task S5 - Siding and trim components with improved weathering performance. INTEGRATED SILL PLATE RIM BOARD ELEMENTS: Task C1 - Examine the commercial solutions currently available for resisting lateral loads in the light-frame construction and provide a market assessment of the competitive landscape for these solutions. Task C2 - Mechanisms to improve the durability of Oriented Strand Board (OSB). Task C3 - Develop wood-plastic composite sill plate/rim board construction system.

DTIC

Buildings; Composite Materials; Durability; Plastics; Strands; Wood

20070013657 State Univ. of New York, Buffalo, NY, USA

Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting

Jung, W.; Chiewanichakorn, M.; Aref, A. J.; Sep. 21, 2006; 352 pp.; In English

Contract(s)/Grant(s): NSF-EEC-9701471

Report No.(s): PB2007-106986; MCEER-06-0010; No Copyright; Avail.: CASI: [A16](#), Hardcopy

In this research, three prefabricated PMC infill panel systems for seismic retrofitting were proposed. The PMC infill panels were studied using experimental methods to assess their effectiveness and response under simulated earthquake loading. Applying the concept of combined interface damping layers to the proposed panel systems was found to be highly feasible in the seismic applications. Design and fabrication procedures for each PMC infill panel were presented, and a conceptual trial design was performed using finite element (FE) analysis. To validate the proposed systems in real situations, both monotonic and cyclic-loading tests were performed on full-scale models. According to the authors, the results obtained from this research showed that the systems offer the potential to increase the damping as well as the lateral resistance of steel frames, with a relatively low cost of retrofitting. Tables, figures and references are included.

NTIS

Composite Structures; Earthquakes; Matrix Materials; Panels; Polymer Matrix Composites; Retrofitting

20070013687 Polytechnic Univ., Brooklyn, NY, USA

Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads

Juran, I.; Komornik, U.; Aug. 2006; 100 pp.; In English

Contract(s)/Grant(s): DTFH61-99-X-00024

Report No.(s): PB2007-106795; No Copyright; Avail.: National Technical Information Service (NTIS)

Composite piles have been used primarily for fender piles, waterfront barriers, and bearing piles for light structures. In 1998, the Empire State Development Corporation (ESDC) undertook a waterfront rehabilitation project known as Hudson

River Park. The project is expected to involve replacing up to 100,000 bearing piles for lightweight structures. The corrosion of steel, deterioration of concrete, and vulnerability of timber piles has led ESDC to consider composite materials, such as fiber-reinforced polymers (FRP), as a replacement for piling made of timber, concrete, or steel. Concurrently, the Federal Highway Administration (FHWA) initiated a research project on the use of FRP composite piles as vertical load-bearing piles. A full-scale experiment, including dynamic and static load tests (SLT) on FRP piles was conducted at a site provided by the Port Authority of New York and New Jersey (PANY&NJ) at its Port of Elizabeth facility in New Jersey, with the cooperation and support of its engineering department and the New York State Department of Transportation (NYSDOT). The engineering use of FRP-bearing piles required field performance assessment and development and evaluation of reliable testing procedures and design methods to assess short-term composite material properties, load-settlement response and axial-bearing capacity, drivability and constructability of composite piling, soil-pile interaction and load transfer along the installed piling, and creep behavior of FRP composite piles under vertical loads. This project includes: Development and experimental evaluation of an engineering analysis approach to establish the equivalent mechanical properties of the composite material.

NTIS

Fiber Composites; Highways; Loads (Forces)

20070013736 NASA Marshall Space Flight Center, Huntsville, AL, USA

Comprehensive Shuttle Foam Debris Reduction Strategies

Semmes, Edmund B.; January 2007; 15 pp.; In English; 45th AIAA Aerospace Sciences Meeting, 8-11 Jan. 2007, Reno, NV, USA; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013736>

The Columbia Accident Investigation Board (CAIB) was clear in its assessment of the loss of the Space Shuttle Columbia on February 3, 2003. Foam liberated from the External Tank (ET) impacting the brittle wing leading edge (WLE) of the orbiter causing the vehicle to disintegrate upon re-entry. Naturally, the CAB pointed out numerous issues affecting this exact outcome in hopes of correcting systems of systems failures any one of which might have altered the outcome. However, Discovery's recent return to flight (RTF) illustrates the primacy of erosion of foam and the risk of future undesirable outcomes. It is obvious that the original RTF focused approach to this problem was not equal to a comprehensive foam debris reduction activity consistent with the high national value of the Space Shuttle assets. The root cause is really very simple when looking at the spray-on foam insulation for the entire ET as part of the structure (e.g., actual stresses \leq materials allowable) rather than as some sort of size/weight limited ablator. This step is paramount to accepting the CAB recommendation of eliminating debris or in meeting any level of requirements due to the fundamental processes ensuring structural materials maintain their integrity. Significant effort has been expended to identify root cause of the foam debris In-Flight Anomaly (FA) of STS-114. Absent verifiable location specific data pre-launch (T-0) and in-flight, only a most probable cause can be identified. Indeed, the literature researched corroborates NASNTM-2004-2 13238 disturbing description of ill defined materials characterization, variable supplier constituents and foam processing irregularities. Also, foam is sensitive to age and the exposed environment making baseline comparisons difficult without event driven data. Conventional engineering processes account for such naturally occurring variability by always maintaining positive margins. Success in a negative margin range is not consistently achieved. Looking at the ET's spray-on foam insulation as part of the structural system (e.g., glass half full mentality) will create an environment where ET debris levels as low as reasonably achievable (ALARA) can be realized. ALARA is a NASA requirements philosophy deployed for the complex, mission altering radiation exposure requirements for life safety of astronauts. In the Shuttle's case, reasonableness is established by exhaustive engineering rigor, allowable debris size/quantity, technology maturity and programmatic constraints. A more robust urethane foam thermal protection system (TPS) will enhance the functionality of the new Ares I Crew Launch Vehicle (CLV) Upper Stage. This paper will outline the strategy for a comprehensive effort to reduce ET foam debris and outline steps leading to an improved foam TPS. The NASA must remain committed to such an approach no matter what becomes of the next flight's actual debris field lest we fall back into a false sense of security. This commitment along with full implementation of all the other CAB recommendations such as orbiter hardening will significantly improve the Shuttle system, the engineering workforce, future capabilities & alternate policy off-ramps, national human resource protection, high value national asset protection and increase the level of service to the overall NASA mission.

Derived from text

Debris; Space Shuttles; Spacecraft Construction Materials; Polyurethane Foam

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

Includes the analysis, synthesis, and use of inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information see category *34 Fluid Dynamics and Thermodynamics*. For astrochemistry see category *90/Astrophysics*.

20070011415 Defence Science and Technology Organisation, Victoria, Australia

Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides

Moniodis, Joseph J; Webb, John; Mathys, Gary; Rose, Harry; Mathews, Robert; Nov 2005; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462794; DSTO-TR-1849; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The catalytic degradation of methylphosphonic acid, the final hydrolysis product of some nerve agents, using Fe, Fe₂O₃, FePO₄ and Al/Al₂O₃ was studied by evolved gas analysis - Fourier transform infrared spectroscopy (EGA-FTIR) under nitrogen, air and oxygen atmospheres. All of the compounds catalysed the reaction to some extent (in comparison to heating MPA alone) with Fe₂O₃ being the best catalyst with carbon-containing gases evolving at 375 C under all atmospheres. Temperatures of formation of carbon containing gases using the other catalysts were 400-450 C for Fe, 400-425 C for FePO₄ and ca. 510 C for Al/Al₂O₃. There is some evidence that Fe and Fe₂O₃ reacted with MPA to form an iron phosphate species, which further catalysed the reaction although to a lesser extent.

DTIC

Acids; Degradation; Iron; Iron Oxides; Metal Powder

20070011498 California Univ., Berkeley, CA, USA

Electrochromic Salts Solutions and Devices

Burrell, A. K.; Warner, B. P.; McClesky, T. M.; 24 Nov 04; 19 pp.; In English

Contract(s)/Grant(s): W-7405-ENG-36

Patent Info.: Filed Filed 24 Nov 04; US-Patent-Appl-SN-10-997 483

Report No.(s): PB2007-103284; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Electrochromic salts of dicationic viologens such as methyl viologen and benzyl viologen associated with anions selected from bis(trifluoromethylsulfonyl) imide, bis(perfluoroethylsulfonyl) imide, and tris(trifluoromethylsulfonyl) methide are produced by metathesis with the corresponding viologen dihalide. They are highly soluble in molten quarternary ammonium salts and together with a suitable reductant provide electrolyte solutions that are used in electrochromic windows.

NTIS

Electrochemistry; Electrochromism; Patent Applications; Salts

20070011522 Utah Water Research Lab., Logan, UT, USA

Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer

Sims, R. C.; Sims, J. L.; Sorensen, D. L.; Aug. 1997; 138 pp.; In English

Contract(s)/Grant(s): EPA-68-C8-0058

Report No.(s): PB2007-107084; No Copyright; Avail.: CASI: [A07](#), Hardcopy

UWRL investigators, led by Ronald C. Sims, continue to evaluate the Champion International Superfund Site in Libby, MT. They are investigating the effectiveness of the following biological treatments of contaminated soil and groundwater: (1) surface soil bioremediation in a lined, prepared-bed land and treatment unit; (2) oil-water separation of extracted groundwater after aqueous phase treatment in above-ground, fixed-film bioreactors; and (3) in-situ bioremediation of an upper aquifer. The design, operational, monitoring, and performance activities of each treatment are being considered. The study is part of the US EPA Bioremediation Field Initiative, and began in July 1991.

NTIS

Aquifers; Biodegradation; Environmental Cleanup; Evaluation; Performance Tests; Pollution Control; Soils

20070011529 Environmental Protection Agency, Cincinnati, OH, USA

Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995

Aug. 1995; 133 pp.; In English; Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations., August 8 - 10, 1995, Rye Brook, New York

Report No.(s): PB2007-107076; EPA/600/R-95/076; No Copyright; Avail.: CASI: [A07](#), Hardcopy

The proceedings of the 1995 Symposium on Bioremediation of Hazardous Wastes, hosted by the Office of Research and Development (ORD) of the EPA in Rye Brook, New York. The symposium was the eighth annual meeting for the presentation of research conducted by EPA's Biosystems Technology Development Program (BTDP) and by affiliated Hazardous Substance Research Centers (HSRCs). The document contains abstracts of recent research projects, ranging in scope from laboratory application to cleanup evaluations in the field. Thirty-three papers and numerous posters presented at the symposium are organized into six program areas: Bioremediation Field Initiative, Performance Evaluation, Field Research, Pilot-Scale Research, Process Research, and Hazardous Substance Research Centers. The proceedings also contain a brief synopsis of introductory remarks made by opening speakers.

NTIS

Conferences; Hazardous Materials; Pollution Control; Waste Treatment; Water Pollution

20070011595 Lawrence Livermore National Lab., Livermore, CA USA

Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments

Etien, R. A.; Gordon, S. R.; Ilevbare, G. O.; January 2006; 13 pp.; In English

Report No.(s): DE2006-894195; No Copyright; Avail.: Department of Energy Information Bridge

Alloy 22 specimens were tested in high temperature (100 to 160 C), high concentration chloride and nitrate environments. Results of this study indicate that increasing nitrate to chloride ratio to 0.5 in these electrolytes increases resistance to localized breakdown and enhances repassivation. In these extreme environments, localized corrosion occurred by pitting even though specimens were tested using artificial crevice formers. Open circuit ($E_{\text{sub corr}}$), breakdown and repassivation potentials all increase, and pitting morphology changes as nitrate to chloride ratio increases from 0.05 and 0.15 to 0.5. Results also indicate that increasing the temperature from 100 to 160 C increases $E_{\text{sub corr}}$ values, while breakdown potentials and repassivation potentials peak at 130 C for the 0.5 nitrate to chloride ratio electrolytes.

NTIS

Chlorides; Electrochemical Corrosion; Hastelloy (Trademark); Nitrates

20070011601 Bozicevic Field and Francis, LLP, Palo Alto, CA, USA

Chemoselective Ligation

Saxon, E.; Bertozzi, C. R.; 19 Jan 05; 37 pp.; In English

Contract(s)/Grant(s): GM58867-01; N00014-98-0605

Patent Info.: Filed 19 Jan 05; US-Patent-Appl-SN-11-039 478

Report No.(s): PB2007-103244; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention features a chemoselective ligation reaction that can be carried out under physiological conditions. In general, the invention involves condensation of a specifically engineered phosphine, which can provide for formation of an amide bond between the two reactive partners resulting in a final product comprising a phosphine moiety, or which can be engineered to comprise a cleavable linker so that a substituent of the phosphine is transferred to the azide, releasing an oxidized phosphine byproduct and producing a native amide bond in the final product. The selectivity of the reaction and its compatibility with aqueous environments provides for its application in vivo (e.g., on the cell surface or intracellularly) and in vitro (e.g., synthesis of peptides and other polymers, production of modified (e.g., labeled) amino acids).

NTIS

Chemical Reactions; Physiology; Phosphines

20070012569 Environmental Protection Agency, Washington, DC USA

Interactive Workshop on Arsenic Removal from Drinking Water (on CD-ROM)

Sep. 2005; In English

Report No.(s): PB2007-500015; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2005, EPA's Office of Water and Office of Research and Development collaborated to present eleven arsenic training events. The workshops provided in-depth treatment technology training to help those affected; state drinking water staff, design engineers, system owners and certified operators become compliant with the new arsenic rule. This CD-ROM integrates the materials presented at these events into an interactive training experience. You will have the opportunity to revisit the presentations, class exercises, current EPA activities, and other related EPA documentation and web links that will assist you in complying with the revised arsenic MCL.

NTIS

Arsenic; CD-ROM; Education; Potable Water

20070012728 Pacific Northwest National Lab., Richland, WA, USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Los Alamos National Lab., NM USA, Geological Survey, Menlo Park, CA, USA

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report

Zachara, J. M.; Brown, G. E.; Davis, J. A.; Lichtner, P. C.; Steefel, C. I.; January 2006; 5 pp.; In English

Report No.(s): DE2006-895617; No Copyright; Avail.: Department of Energy Information Bridge

A sizable groundwater U plume exists in Hanford's 300 A resulting from the disposal of fuel rod dissolution wastes containing Al, Cu, and U to the vadose zone. This project is studying U-contaminated samples collected along a flow path from the waste source to the Columbia River. Three primary objectives are being pursued: (1) To develop microscopic models for U desorption/adsorption in sediments along the flow path including both geochemical reaction and diffusive mass transport processes. (2) To parameterize the microscopic models with appropriate laboratory measurements and data within context of a dual continuum, reactive transport model (DCM). (3) To apply the parameterized DCM to laboratory columns of different size and sediment texture for testing of scaling hypotheses.

NTIS

Desorption; Dissolving; Radioactive Wastes; Reactivity; Rods; Waste Management

20070012730 Clinton National Lab., Oak Ridge, TN, USA

Microcantilever Sensors for In-Situ Subsurface Characterization. 2006 ERSD Annual Report

Thundat, T. G.; Hu, Z.; Brown, G. M.; Gu, B.; January 2006; 6 pp.; In English

Report No.(s): DE2006-895615; No Copyright; Avail.: Department of Energy Information Bridge

Real-time, in-situ analysis is critical for decision makers in environmental monitoring, but current techniques for monitoring and characterizing radionuclides rely primarily on liquid scintillation counting, ICP-MS, and spectrofluorimetry, which require sample handling and labor intensive lengthy analytical procedures. Other problems that accompany direct sampling include adherence to strict holding times and record maintenance for QA/QC procedures. Remote, automated sensing with direct connection to automated data management is preferred.

NTIS

Characterization; Detection; Environmental Monitoring; Radioactive Isotopes

20070012734 Illinois Univ., Chicago, IL, USA

Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species

Brezinsky, K.; January 2006; 42 pp.; In English

Contract(s)/Grant(s): DE-FG0298ER14897

Report No.(s): DE2006-895611; No Copyright; Avail.: Department of Energy Information Bridge

The principal focus of this research program is aimed at understanding the oxidation and pyrolysis chemistry of primary aromatic molecules and radicals with the goal of developing a comprehensive kinetic model at conditions that are relevant to practical combustion devices. A very high pressure single pulse shock tube is used to obtain experimental data over a wide pressure range in the high pressure regime, 5-1000 bars, at pre-flame temperatures for fuel pyrolysis and oxidation over a broad spectrum of equivalence ratios. Stable species sampled from the shock tube are analyzed using standard chromatographic techniques using GC/MS-PDD and GC/TCD-FID. Experimental data from the HPST (stable species profiles) and data from other laboratories (if available) are simulated using kinetic models (if available) to develop a comprehensive model that can describe aromatics oxidation and pyrolysis over a wide range of experimental conditions. The shock tube has been heated (1000C) recently to minimize effects due to condensation of aromatic, polycyclic and other heavy species. Work during this grant period has focused on 7 main areas summarized in the final technical report.

NTIS

Combustion; High Pressure; Oxidation; Pressure Pulses; Pyrolysis; Shock Tubes

20070012782 Lawrence Livermore National Lab., Livermore, CA USA

Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59

Wong, L. L.; King, K. J.; Martin, S. I.; Rebak, R. B.; Feb. 2006; 19 pp.; In English

Report No.(s): DE2006-894779; UCRL-TR-218665; No Copyright; Avail.: Department of Energy Information Bridge

The corrosion rate of a metal (alloy) can be measured using: (1) Immersion tests or weight loss such as in ASTM G 1 and G 31 or (2) Electrochemical techniques such as in ASTM G 59. In the polarization resistance (PR) or linear polarization method (G 59), the resistance to polarization (Rp) of a metal is measured in the electrolyte of interest in the vicinity of the

corrosion potential ($E_{\text{sub corr}}$). This polarization resistance can be mathematically converted into corrosion rates (CR). A plot of E vs. I in the vicinity of $E_{\text{sub corr}}$ is generated by increasing the potential at a fixed rate of 0.1667 mV/s and measuring the output current. The polarization resistance (R_p) is defined as the slope of a potential (E) (Y axis) vs. Current (I) (X axis) plot in the vicinity of the corrosion potential ($E_{\text{sub corr}}$). When the potential is ramped and the current is measured, E is the independent variable and I is the dependent variable. In a proper mathematical plot, E should be represented in the X axis and I in the Y axis. However, in the conventions of the corrosion community, E is always plotted in the Y axis and I in the X axis. Therefore, how this plot of $\Delta E/\Delta I$ is analyzed is a matter of current debate.

NTIS

Corrosion Resistance; Polarization; Alloys

20070012793 Naval Postgraduate School, Monterey, CA USA

Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine

Hutcheson, Patrick D; Dec 2006; 117 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-06-WR-20161

Report No.(s): AD-A462628; No Copyright; Avail.: CASI: A06, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462628>

The initiation of a detonation in Pulse Detonation Engines (PDE) has been identified as one of the critical and enabling technologies for PDEs. In particular, the initiation of practical fuel-air mixtures containing liquid droplets without supplementary oxygen or other high loss mechanisms is a capability that could enable the PDE to exceed the performance of ramjets and expendable turbo-machinery based systems. Although past engine designs have relied upon a sensitive fuel/oxygen initiator unit or unrealistic gaseous fuels such as ethylene and propane, a PDE was designed and partially tested that has eliminated the requirement for supplementary oxygen as well as enabling the use of a JP-10, high-density liquid fuel. Air flow through segments of this PDE was simulated using Computational Fluid Dynamics and experimentally evaluated in the laboratory at simulated flight conditions, including supersonic cruising conditions. The spiral lined initiator demonstrated a lower total pressure loss when compared to the geometry with rings, and thus was the preferred initiator configuration. Experimental values for the turbulence were found to be significantly lower than the computed values at similar conditions. Finally, successful ignitions of the JP-10/Air initiator at frequencies of up to 20 Hz were experimentally demonstrated.

DTIC

Detonation; Jet Engine Fuels; Performance Prediction; Propulsion System Configurations; Propulsion System Performance; Pulse Detonation Engines

20070012809 New York Medical Coll., Valhalla, NY USA

Cellular Targets of Dietary Polyphenol Resveratrol

Wu, Joseph M; Sep 2006; 24 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0059

Report No.(s): AD-A462814; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462814>

To test the hypothesis that resveratrol, a grape derived polyphenol, exerts its chemopreventive properties against prostate cancer by interacting with specific cellular targets, denoted resveratrol targeting proteins (RTPs). To explore the existence of RTPs in androgen-dependent LNCaP and androgen-independent (PC-3) cells, by chemically immobilizing resveratrol on epoxy-activated agarose to generate a biospecific affinity matrix for isolating and purifying RTPs from cell extracts. By combining resveratrol affinity chromatography with MALDI-TOF mass spectrometry, we have identified dihydronicotinamide riboside:quinone reductase (NQO2) as a distinct RTP from LNCaP and PC-3 cells. As mentioned in the annual report, we are in the process of possibly identifying another RTP. This goal has been achieved in PC-3 cell extracts by combining resveratrol affinity column chromatography with mass spectrophotometry. The second RTP is glutathione sulfotransferase GST-Pi. We have identified two resveratrol RTPs, respectively, NQO2 and GST-Pi, both with function in detoxification reactions. Our findings suggest that resveratrol might function as a chemopreventive agent by interacting and modulating activity and/or stability of detoxification enzymes.

DTIC

Cancer; Diets; Phenols; Prostate Gland; Proteins; Targets

20070012820 Air Force Research Lab., Wright-Patterson AFB, OH USA

Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint)

Carns, Jennifer L; Cook, Gary; Saleh, Mohammad A; Serak, Svetlana V; Tabiryani, Nelson V; Evans, Dean R; Jan 2006; 6 pp.; In English

Contract(s)/Grant(s): Proj-M08R

Report No.(s): AD-A462932; AFRL-ML-WP-TP-2006-473; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462932>

We show that photovoltaic fields are capable of efficiently reorienting liquid crystals, leading to new concepts of optically addressable light modulators. Using an arrangement consisting of a liquid-crystal layer between LiNbO₃:Fe photovoltaic substrates, we observed spatial filtering due to self-phase modulation in a planar oriented cell and nonlinear transmission between crossed polarizers in a twist-oriented cell. These processes do not require an external electric field. The substrates are arranged such that light propagates along the +c axis in each substrate, allowing a secondary process of power transfer to occur through contra directional photorefractive two-beam coupling.

DTIC

Liquid Crystals; Lithium Niobates; Photovoltaic Effect; Substrates

20070012825 Pennsylvania Univ., Philadelphia, PA USA

Quenching Dynamics of Electronically Excited Hydroxyl Radicals

Lester, Marsha I; Jan 19, 2007; 7 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0068

Report No.(s): AD-A462945; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462945>

Collisional quenching of electronically excited OH A 2-Sigma+ radicals by molecular partners has been investigated over the past 25 years, principally by evaluating the quenching cross sections for partners of aeronautical, atmospheric, and/or combustion relevance. Yet little is known about the outcome of these electronic quenching events, except that they facilitate the efficient removal of OH from the excited A 2-Sigma+ electronic state by introducing nonradiative decay pathways. Most recently, we carried out the first experimental investigation of the nonreactive decay channel with molecular hydrogen by examining the quantum state distribution of the ground state OH X 2-Pi products. The OH X 2-Pi product state distribution is highly nonstatistical, with a strongly inverted rotational distribution for v=1, demonstrating that a significant torque is applied to OH as purely electronic energy is converted into internal excitation of the OH X 2-Pi products. The high degree of rotational excitation is a direct manifestation of the forces in the vicinity of the conical intersection region(s) that lead to quenching.

DTIC

Electron States; Hydroxyl Radicals

20070012859 Eidgenoessische Technische Hochschule, Lausanne, Switzerland

Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells

Graetzel, Michael; Sep 13, 2006; 47 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-03-1-3068

Report No.(s): AD-A463001; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463001>

This report results from a contract tasking Swiss Federal Institute of Technology (EPFL) as follows: The Grantee will investigate and develop a new class of polymer-gel electrolytes for use in flexible dye-sensitized solar cells in order to boost power efficiencies above the 15% light to electrical conversion efficiency

DTIC

Dyes; Electrolytes; Energy Conversion; Low Cost; Polymer Chemistry; Solar Cells

20070012868 Leeds Univ., UK

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources

Richards, Billy; Shen, Shaoxiong; Jha, Animesh; Jul 24, 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-05-1-3039; Proj-053039

Report No.(s): AD-A463019; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463019>

This report results from a contract tasking University of Leeds as follows: Task 1 (0-5 months): Optimise tellurium oxide (TeO₂), fluorine-containing silicate (SiOF₂) and germanate (GeOF₂) glass hosts for each dopant by characterising the spectroscopic properties, including absorption and emission cross-sections and the lifetimes of the lasing levels. Design multimode fibres for the analysis of pump photon ion interaction, and for examining any detrimental effects. A preliminary investigation on various pumping schemes using semiconductor diode laser wavelengths at 800 nm, 940 nm, 960 nm, 980 nm, 1480 and 1550 nm will be explored. Deliverable Report 1: A comparison of the spectroscopic properties of RE-ion (doped Tm³⁺, Ho³⁺, and U³⁺) and their suitability for tunable laser source. Task 2 (6th-7th month): Multimode fibres will be drawn to study the interaction of pump photons in a long interaction path length, from which we will be able to investigate the potential sources of ESA, favourable or detrimental energy transfer and pumping scheme. Also consider whether all the dopants should be incorporated in a single core, or to have each dopant in a separate core around a common cladding, so that the high-power pump source can provide sufficient excitation for Tm³⁺, Ho³⁺, and U³⁺ acceptor ions and Yb³⁺ as the sensitizer ions. Task 3 (8th-9th month): Quantify the quantum efficiency of individual transitions in the dopants. Using carefully designed fibres with Ho or Tm, undertake a preliminary investigation of the laser experiment and establish the required threshold and slope efficiency in either Tm-doped or Ho-doped fibres. Deliverable report 2: Summary of fibre spectroscopy and preliminary gain characterisation using a suitable pumping scheme.

DTIC

Broadband; Coherent Radiation; Fibers; Glass; Ions; Metal Ions; Oxides; Radiation Sources; Rare Earth Elements; Spectroscopy; Tellurides; Tunable Lasers

20070012881 Cambridge Univ., Cambridge, UK

Optical Characterization of Micro Particles in Molecular Plasmas

Davies, Paul B; Feb 10, 2006; 16 pp.; In English

Contract(s)/Grant(s): FA8655-05-1-3023

Report No.(s): AD-A463044; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463044>

This report results from a contract tasking University of Cambridge as follows: Understanding the role of nano and micro sized particles in industrial processes and in the atmosphere using plasmas has become very important. The grantee proposes to develop a novel, sensitive and non-invasive diagnostic technique for probing the chemical composition of solid particle surfaces in dusty plasmas. Specifically, pulsed tuneable lasers will be used to excite whispering gallery modes (wgms) in individual silica microspheres trapped in a plasma crystal. This novel chemical probe will link the particle composition to the chemical composition of the plasma.

DTIC

Chemical Composition; Microparticles; Molecules; Plasmas (Physics); Pulsed Lasers

20070012888 Courter Products, Boyne City, MI USA

Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon

Arnaold, David P; Das, Sauparna; Cros, Florent; Zana, Iulica; Allen, Mark G; Lang, Jeffrey H; Apr 2006; 10 pp.; In English

Contract(s)/Grant(s): DAAD19-01-2-010

Report No.(s): AD-A463055; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463055>

This paper presents the design, fabrication, and characterization of laminated, magnetic induction machines intended for high-speed, high-temperature, high-power-density, silicon-based microengine power generation systems. Innovative fabrication techniques were used to embed electroplated materials (Cu, Ni₈₀Fe₂₀, Co₆₅Fe₁₈Ni₁₇) within bulk-micromachined and fusion-bonded silicon to form the machine structures. The induction machines were characterized in motoring mode using tethered rotors, and exhibited a maximum measured torque of 2.5 microNu m.

DTIC

Electric Generators; Electric Power Plants; Integrated Circuits; Magnetic Induction; Micromachining; Silicon

20070012907 Air Force Research Lab., Hanscom AFB, MA USA

Analysis of the Electro spray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle

Chiu, Yu-Hui; Gaeta, Geraldine; Heine, Thomas R; Dressler, Rainer A; Levandier, Dale J; Jul 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A463085; AFRL-VS-HA-TR-2007-1009; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463085>

The room temperature ionic liquid propellant, 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide (EMI-Im) is being tested for the NASA DRS-ST7 mission. A capillary thruster configuration is planned for ST7, and time-of-flight experiments have shown that the spray of EMI-Im produces a mixture of primarily droplets and low levels of ions, resulting in a low specific impulse. Recently, pure ion emission was achieved for EMI-Im in a wetted needle thruster, suggesting that this propellant, which has passed all space environmental exposure tests, may also be a candidate for high specific impulse missions. The use of wetted tips raises the question whether electrochemistry at the liquid-metal interface causes significant propellant fouling that will ultimately result in performance degradation due to the significantly longer propellant metal interaction times in comparison with the capillary design and the higher flow rates. Electrochemical fouling can be mitigated through a polarity alternation approach, which adds complexity to the power processing unit.

DTIC

Emission; Ions; Liquid Rocket Propellants; Mass Spectroscopy; Needles; Plumes; Propellants; Tungsten

20070012959 Anteon Corp., Dayton, OH USA

Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint)

Carns, Jennifer L; Cook, Gary; Saleh, Mohammad A; Serak, Svetlana V; Tabiryan, Nelson V; Basun, Sergei A; Evans, Dean R; Jan 2006; 12 pp.; In English

Contract(s)/Grant(s): Proj-M08R

Report No.(s): AD-A463273; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463273>

We show that photovoltaic fields generated internally in LiNbO₃:Fe substrates are capable of efficiently reorienting liquid crystal molecules leading to new concepts of optically addressable light modulators. Using an arrangement consisting of a liquid crystal layer in contact with one or more LiNbO₃:Fe photovoltaic substrates, we observe spatial filtering due to self-phase modulation in a planar oriented cell. The LiNbO₃:Fe substrates are arranged such that light propagates along the +c axis, allowing a secondary process of power transfer to occur through photorefractive contra-directional two-beam coupling.

DTIC

Liquid Crystals; Phase Modulation; Photovoltaic Effect

20070013276 University of Southern California, Los Angeles, CA USA

High Energy Density Material Chemistry

Christe, Karl O; Nov 5, 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-02-1-0229

Report No.(s): AD-A463493; USC-AFOSR-USC-2006; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The overall objectives of this research are the syntheses and characterization of polynitrogen, high-nitrogen and high-oxygen energetic materials, useful as propellants or explosives ingredients. Excellent results were obtained in all areas and are summarized in 38 publications and 2 patents. The chemistry of N₅⁺ was developed and 13 new N₅⁺ salts were prepared and characterized. It was demonstrated that N₅⁺ cations can be combined with doubly charged anions, thereby doubling the N₅⁺ content of a salt. Furthermore, it was shown that N₅⁺ can be combined with highly energetic counter-ions. Another novel polynitrogen ion, discovered under this program by electrospray ion mass spectroscopy, is the cyclo-N₅ anion. Two other novel polynitrogen species, were prepared and characterized. A new method for the processing of nitrogen NMR data with greatly improved signal to noise ratios was developed and successfully applied to N₅⁺. A large number of novel polynitrides were prepared and characterized. A new concept for liquid monopropellants, based on oxygen-balanced energetic ionic liquids, was developed and successfully demonstrated. A new stable reagent, for the introduction of gem-bis NF₂ groups was developed. A new solid-gas process, which avoids liquid phase quenching was invented for generating singlet delta oxygen for the COIL laser.

DTIC

Monopropellants; Nitrogen

20070013329 Air Force Research Lab., Wright-Patterson AFB, OH USA

Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Postprint)

Fair, Geoff E; Hay, Randall S; Boakye, Emmanuel E; Feb 2007; 10 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463620; AFRL-ML-WP-TP-2006-480; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Monazite coatings were deposited on woven cloths and tows of Nextel(trademark) 610 fibers by heterogeneous nucleation

and growth using solution precursors. Initial experiments revealed two coating regimes in which monazite was either precipitated both in solution and onto the fiber surfaces or only onto the fiber surfaces depending on the precursor solution concentration and fiber surface area. In both cases, regions of tightly packed fibers within cloths were uncoated. Image analysis of coated fiber cross-sections revealed a strong correlation between fiber separation and coating thickness, suggesting that coating of tightly packed fibers was limited by transport of the reactants in solution to these areas. By adopting a coating procedure in which the tightly packed regions are saturated with reactants before precipitation, more uniform coatings of monazite were obtained throughout the cloth; however, the strength of as-coated and heat-treated fibers was degraded and remains problematic.

DTIC

Ceramic Fibers; Ceramics; Coating; Coatings; Fabrics; Feasibility; Precipitation (Chemistry)

20070013335 Universal Energy Systems, Inc., Dayton, OH USA

Modeling Plasticity of Ni₃Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint)

Choi, Yoon-Suk; Dimiduk, Dennis M; Uchic, Michael D; Parthasarathy, Triplicane A; Jul 2006; 55 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8650-04-D-5233; Proj-2311

Report No.(s): AD-A463681; No Copyright; Avail.: CASI: [A04](#), Hardcopy

A comprehensive mechanism-based crystallographic constitutive model has been developed for L 12-structured Ni₃Al-based intermetallic single crystals. This model represents the unusual thermo-mechanical behaviors of Ni₃Al, such as the anomalous temperature dependence of both the flow stress and strain-hardening rate (SHR), the strain dependence of these anomalous behaviors, and an orientation-dependent tension-compression asymmetry. The model framework was based on two major contributions to plastic flow, namely the repeated cross-slip exhaustion and athermal defeat of screw-character dislocations, and the motion of the macro-kinks (MKs). The contribution of irreversible obstacle storage was incorporated into the constitutive formulations as a resistance against the glide of MKs. The model was implemented in a finite element method numerical framework, and the simulation results showed qualitative agreement with experimental observations.

DTIC

Aluminum Alloys; Aluminum Compounds; Intermetallics; Nickel Alloys; Plastic Flow; Plastic Properties; Single Crystals; Temperature Dependence; Thermodynamics

20070013354 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Environmental Sentinel Biomonitor (ESB) System Technology Assessment

Kooistra, Scott; Walther, John D; Wurster, Lindsey; Feb 2007; 102 pp.; In English

Report No.(s): AD-A463721; ECBC-TR-517; No Copyright; Avail.: CASI: [A06](#), Hardcopy

The U.S. Army Center for Environmental Health Research, with support from Army client organizations and funding from Army Science and Technology Objective (STO) IV.ME.2004.03, is developing an Environmental Sentinel Biomonitor (ESB) system to provide rapid toxicity identification for a broad spectrum of chemicals in water. A critical initial phase of the STO is to test and evaluate toxicity sensor technologies (also called ESB system technologies). Because there are a number of potentially feasible technologies that could meet the goals of the ESB program, a downselect was performed to evaluate these technologies and select the most promising technologies for further development as part of an ESB system. The methodology and process to complete the downselect was developed with user representatives and technology experts. The methods and processes used produce repeatable, defensible, and justifiable investment decisions.

DTIC

Contamination; Lethality; Potable Water; Sentinel System; Technology Assessment; Toxicity

20070013361 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System

Kuciapinski, Kevin S; Sep 2005; 84 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463742; AFIT/GSS/ENP/05-01; No Copyright; Avail.: CASI: [A05](#), Hardcopy

This research examined the possibility of using a non-mechanical beam steering device to steer the beam of a coherent laser radar system. Non-mechanical beam steering devices offer many advantages in size, weight, power requirements, and steering speeds. Additionally, non-mechanical beam steering devices present the capabilities of splitting a single beam into multiple beams as well as beam forming and expanding. The coherent laser radar system used was a Laser Vibrometer System.

The beam of the laser vibrometer was steered from 0 mrad to 3 mrad at 1 mrad increments using the liquid crystal on silicon (LCOS) device. The laser vibrometer was able to accurately measure a 2500 Hz vibration target on the steered vibrometry beam at all steered angles. A small LCOS noise signal was detected. The LCOS noise spectrum was determined to be consistent and predictable located at 60 Hz harmonics and was successfully subtracted from the signal. The LCOS device was used to split the vibrometry beam into 2 separate beams. The vibrometer was able to accurately measure two simultaneous independent target signals over the split beam.

DTIC

Beam Steering; Lasers; Liquid Crystals; Silicon; Steering; Vibration Meters

20070013412 Lawrence Livermore National Lab., Livermore, CA USA

Selection of Corrosion Resistant Materials for Nuclear Waste Repositories

Rebak, R. B.; Jun. 2006; 18 pp.; In English

Report No.(s): DE2006-894765; UCRL-PROC-221893; No Copyright; Avail.: Department of Energy Information Bridge

Several countries are considering geological repositories to dispose of nuclear waste. The environment of most of the currently considered repositories will be reducing in nature, except for the repository in the US, which is going to be oxidizing. For the reducing repositories alloys such as carbon steel, stainless steels and titanium are being evaluated. For the repository in the US, some of the most corrosion resistant commercially available alloys are being investigated. This paper presents a summary of the behavior of the different materials under consideration for the repositories and the current understanding of the degradation modes of the proposed alloys in ground water environments from the point of view of general corrosion, localized corrosion and environmentally assisted cracking.

NTIS

Corrosion Resistance; Radioactive Wastes; Waste Disposal

20070013489 Norwegian Defence Research Establishment, Umea, Sweden

Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry

Nygren, Y.; Jan. 2006; 44 pp.; In English

Report No.(s): PB2007-103418; FOI-R-1901-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

Gas chromatography (GC) coupled to mass spectrometry (MS) has for a long time been the predominating method for the qualitative analysis of O-alkyl alkylphosphonic acids. Prior analysis, trimethylsilylation is used for esterification in order to increase the volatility prior to GC. To minimize the need for sample preparation methods based on liquid chromatography-tandem mass spectrometry (LC/MS/MS) with electrospray ionization (ESI) in the positive ion mode have been developed. MS and MS/MS-spectra from these methods give diagnostic fragments from the alkylphosphonic acid, which together with the molecular ion gives information about the size of the O-alkyl group. However, information about branching of the O-alkyl group cannot be found, and identification is limited to the number of carbons in the O-alkyl chain only. In the present study, high energy collision induced fragmentation in negative mode ESI-MS/MS showed to produce improved structural information compared to GC/MS (EI) analysis. The product spectra show fragments from hemolytic cleavages in the O-alkyl chain (So called charge-remote fragmentation), which makes elucidation of the structure of the O-alkyl chain possible and thus provides full identification of isomeric phosphonic acids.

NTIS

Alkyl Compounds; Collisions; Dissociation; Ionization; Mass Spectroscopy; Nerves

20070013517 Foster-Miller Associates, Inc., Waltham, MA, USA

No VOC Radiation Curable Resin Compositions with Enhanced Flexibility

Kovar, R. F.; Orbey, N.; 9 Mar 05; 36 pp.; In English

Contract(s)/Grant(s): AF-F09650-98-M-1024

Patent Info.: Filed Filed 9 Mar 05; US-Patent-Appl-SN-11-077-189

Report No.(s): PB2007-101663; No Copyright; Avail.: CASI: A03, Hardcopy

The present invention provides radiation curable resin compositions having enhanced low temperature flexibility and to methods of using these compositions. The radiation curable resin compositions contain no or essentially no volatile organic components (VOCs), and find particular use as coating compositions. In particular, the radiation curable resin compositions

of this invention comprise a vinyl dioxolane end-capped oligomer blended with a photoinitiator.

NTIS

Curing; Flexibility; Organic Compounds; Resins

20070013537 Air Products and Chemicals, Inc., Allentown, PA, USA

Method of Making an Ion Transport Membrane Oxygen Separation Device

Cutler, R. A.; Hutchings, K. N.; Anderson, M.; Hollis, R. A.; Taylor, D. M.; 1 Mar 05; 23 pp.; In English

Contract(s)/Grant(s): DOD-F1624-00-C-6000

Patent Info.: Filed 1 Mar 05; US-Patent-Appl-SN-11-070-720

Report No.(s): PB2007-101684; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Method of making an electrochemical device for the recovery of oxygen from an oxygen-containing feed gas comprising (a) preparing a green electrochemical device by assembling a green electrolyte layer, a green anode layer in contact with the green electrolyte layer, a green cathode layer in contact with the green electrolyte layer, a green anode-side gas collection interconnect layer in contact with the green anode layer, and a green cathode-side feed gas distribution interconnect layer in contact with the green cathode layer; and (b) sintering-the green electrochemical device by heating to yield a sintered electrochemical device comprising a plurality of sintered layers including a sintered anode-side gas collection interconnect layer in contact with the anode layer and adapted to collect oxygen permeate gas, wherein each sintered layer is bonded to an adjacent sintered layer during sintering.

NTIS

Membranes; Oxygen; Separation; Electrochemistry; Mechanical Devices

20070013741 NASA Marshall Space Flight Center, Huntsville, AL, USA

Vacuum Strength of Two Candidate Glasses for a Space Observatory

Manning, T. a.; Tucker, D. S.; Herren, K. A.; Gregory, D. A.; [2007]; 9 pp.; In English; Copyright; Avail.: CASI: [C01](#),

CD-ROM: [A02](#), Hardcopy

The strengths of two candidate glass types for use in a space observatory were measured. Samples of ultra-low expansion glass (ULE) and borosilicate (Pyrex) were tested in air and in vacuum at room temperature (20 C) and in vacuum after being heated to 200 C. Both glasses tested in vacuum showed an increase in strength over those tested in air. However, there was no statistical difference between the strength of samples tested in vacuum at room temperature and those tested in vacuum after heating to 200 C.

Author

Observatories; Vacuum Systems; Space Surveillance (Spaceborne); Manufacturing; Borosilicate Glass

26

METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

20070011552 California Univ., San Diego, La Jolla, CA, USA, National Energy Technology Lab., Pittsburgh, PA USA
Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quaterly Technical Progress Report July 1-September 30, 2006

Kad, B. K.; Oct. 27, 2006; 15 pp.; In English

Report No.(s): DE2006-894894; No Copyright; Avail.: National Technical Information Service (NTIS)

The objectives of this program are to (1) increase creep-strength at temperature in ODS-alloy tube and liner components by 100% via, (2) preferential cross-roll flow forming and grain/particle fibering in the critical hoop direction. The research program outlined here is iterative in nature and is intended to systematically (1) examine and identify post-extrusion forming methodologies to create hoop strengthened tubes, which will be (2) evaluated at 'in-service' loads at service temperatures and environments.

NTIS

Augmentation; Creep Properties; Cross Flow; Heat Exchangers; Hoops; Roll Forming

20070011556 Weissburg (Steven J.), Cambridge, MA, USA, Massachusetts Inst. of Tech., Cambridge, MA, USA
Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts

Kernan, B. D.; Sachs, E. M.; Allen, S. M.; Lorenz, A. M.; 26 Nov 03; 63 pp.; In English

Contract(s)/Grant(s): ONR-N00014-99-1-1090

Patent Info.: Filed 26 Nov 03; US-Patent-Appl-SN-10-723 989

Report No.(s): PB2007-101598; No Copyright; Avail.: CASI: A04, Hardcopy

A steel powder metal skeleton is infiltrated with an infiltrant composition similar to the skeleton, with an additional agent that depresses the melting point of the infiltrant relative to the skeleton. Infiltration is driven primarily by capillary pressure. The powder and infiltrant compositions differ primarily only in a higher concentration of a melting point depressant agent 'MPD' in the infiltrant. Carbon (C) and silicon (Si) and several other elements can be elements in an MPD, either alone or in combination. Certain steel target compositions are such that a complementary infiltrant, and skeleton can be chosen such that a skeleton will remain solid at an infiltration temperature at which the infiltrant can be melted and fully infiltrated, and further where there is a persistent two phase field, with a liquid phase that is large enough (greater than 7% vol, and typically between 20 and 40 % vol) so that flow can be maintained without choke off from diffusional solidification. The solid and the liquid phases remaining after any diffusional solidification have different compositions, with a bulk composition of the target. Typically the difference is slight, and the full part is substantially homogeneous. Heat treating, such as austenitizing, quenching, or slow cooling and tempering, can improve homogeneity and mechanical properties. The MPD can have a relatively high diffusivity and solubility in the skeleton. Methods of designing systems of target, skeleton and infiltrant compositions and infiltration temperature are disclosed.

NTIS

Fabrication; Infiltration; Liquid Phases; Melting Points; Metal Powder; Musculoskeletal System; Steels

20070011588 Lawrence Livermore National Lab., Livermore, CA USA

c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story

Sherby, O.; Wadsworth, J.; Lesuer, D.; Syn, C.; Feb. 02, 2006; 10 pp.; In English

Report No.(s): DE2006-893988; UCRL-CONF-218604; No Copyright; Avail.: National Technical Information Service (NTIS)

The body-centered tetragonal (BCT) structure in quenched Fe-C steels is usually illustrated to show a linear change in the c and a axes with an increase in carbon content from 0 to 1.4% C. The work of Campbell and Fink, however, shows that this continuous linear relationship is not correct. Rather, it was shown that the body-centered-cubic (BCC) structure is the stable structure from 0 to 0.6 wt% C with the c/a ratio equal to unity. An abrupt change in the c/a ratio to 1.02 occurs at 0.6 wt% C. The BCT structure forms, and the c/a ratio increases with further increase in carbon content. An identical observation is noted in quenched Fe-N steels. This discontinuity is explained by a change in the transformation process. It is proposed that a two-step transformation process occurs in the low carbon region, with the FCC first transforming to HCP and then from HCP to BCC. In the high carbon region, the FCC structure transforms to the BCT structure. The results are explained with the Engel-Brewer theory of valence and crystal structure of the elements. An understanding of the strength of quenched iron-carbon steels plays a key role in the proposed explanation of the c/a anomaly based on interstitial solutes and precipitates.

NTIS

Body Centered Cubic Lattices; Carbon; Heuristic Methods; Steels

20070011589 Lawrence Livermore National Lab., Livermore, CA USA

Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments

Lefrancois, A.; Reisman, D. B.; Bastea, M.; Eplattienier, P. L.; Burger, M.; Feb. 17, 2006; 10 pp.; In English

Report No.(s): DE2006-893989; UCRL-TR-219117; No Copyright; Avail.: National Technical Information Service (NTIS)

Isentropic compression experiments and numerical simulations on metals are performed at Z accelerator facility from Sandia National Laboratory and at Lawrence Livermore National Laboratory in order to study the isentrope, associated Hugoniot and phase changes of these metals (1). 3D configurations have been calculated here to benchmark the new beta version of the electromagnetism package coupled with the dynamics in Ls-Dyna and compared with the ICE Z shots 1511 and 1555. The electromagnetism module is being developed in the general-purpose explicit and implicit finite element program LS-DYNA(reg-sign) in order to perform coupled mechanical/thermal/ electromagnetism simulations. The Maxwell equations are solved using a Finite Element Method (FEM) for the solid conductors coupled with a Boundary Element Method (BEM)

for the surrounding air (or vacuum). More details can be read in the reference (2), (3).

NTIS

Tantalum; Isentropic Processes; Accelerators

20070011602 Honeywell International, Inc., Morristown, NJ, USA

System and Method for Corrosion Maintenance Scheduling

Braunling, R. D.; Dietrich, P. E.; Wrest, D. J.; 6 Jan 04; 7 pp.; In English

Contract(s)/Grant(s): N00014-02-C-0147

Patent Info.: Filed Filed 6 Jan 04; US-Patent-Appl-SN-10-751 449

Report No.(s): PB2007-103249; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A system for scheduling maintenance on equipment includes a metallic element placed on or near a piece of equipment in an environment, a measuring and data storing device configured to measure the resistance of the metallic element, and a computer configured to determine the amount of corrosion experienced by the metallic element based on the resistance measured by the measuring and data storing device and to correlate the amount of corrosion with a maintenance schedule for the piece of equipment. A method for scheduling maintenance on a piece of equipment is also described. The method includes placing a metallic element on or near the piece of equipment, determining the amount of corrosion experienced by the metallic element, and correlating the amount of corrosion with a maintenance schedule for the piece of equipment.

NTIS

Corrosion; Preventive Maintenance; Scheduling

20070011668 Lawrence Livermore National Lab., Livermore, CA USA

Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies

Lesuer, D.; Frommeyer, G.; Sherby, O.; Syn, C.; Feb. 01, 2006; 8 pp.; In English

Report No.(s): DE2006-893996; UCRL-CONF-218597; No Copyright; Avail.: Department of Energy Information Bridge

The work of Frommeyer on electrical conductivity measurements in pearlitic steels is reviewed to provide insight into microstructures developed during wire drawing. Electrical conductivity measurements were made as a function of drawing strain (up to $\epsilon = 6.0$) for wires with strength exceeding 3500MPa. The results show that electrical conductivity increases during wire-drawing to a maximum value, then decreases with further deformation finally reaching a steady state value that is equal to the original conductivity. The initial increase is the result of pearlite plate orientation in the direction of wire drawing, which makes the path of conduction through the ferrite plates more accessible. At a critical strain the cementite plates begin to fragment and the electrical conductivity decreases to a steady state value that is the same as that observed prior to wire drawing. With increasing strain, the cementite particles are refined and the strength increases due to the reduction in inter-particle spacing. It is concluded that the electrical conductivity of the wires is solely dependent on the amount of iron carbides provided they are randomly distributed as plates or as particles. An estimate was made that indicates the carbide particle size is approximately 3-5 nm in the steady state range of electrical conductivity.

NTIS

Carbides; Electrical Resistivity; Metal Drawing; Steels; Wire

20070011757 Luedeka Neely and Graham, P.C., Knoxville, TN, USA

Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides

Morrell, J. S.; Ripley, E. B.; 9 Dec 04; 17 pp.; In English

Contract(s)/Grant(s): DE-AC05-00OR22800

Patent Info.: Filed Filed 9 Dec 04; US-Patent-Appl-SN-11-008 678

Report No.(s): PB2007-103276; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method of reducing target metal oxides and passivated metals to their metallic state. A reduction reaction is used, often combined with a flux agent to enhance separation of the reaction products. Thermal energy in the form of conventional furnace, infrared, or microwave heating may be applied in combination with the reduction reaction.

NTIS

Displacement; Metal Oxides; Metal Powder; Patent Applications; Reduction (Chemistry)

20070012401 NASA Glenn Research Center, Cleveland, OH, USA

Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts

Miyoshi, Kazuhisa; Street, Kenneth W., Jr.; Sanders, Jeffrey H.; Hager, Carl H., Jr.; Zabinski, Jeffrey S.; VanderWal, Randall L.; Andrews, Rodney; Lerch, Bradley A.; February 2007; 20 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 984754.02.07.03.05.01

Report No.(s): NASA/TM-2007-214468; E-15381; Copyright; Avail.: CASI: [A03](#), Hardcopy

The wear behavior of low-cost, lightweight 10-wt% TiC-particulate-reinforced Ti-6Al-4V matrix composite (TiC/Ti-6Al-4V) was examined under fretting at 296, 423, and 523 K in air. Bare 10-wt% TiC/Ti-6Al-4V hemispherical pins were used in contact with dispersed multiwalled carbon nanotubes (MWNTs), magnetron-sputtered diamondlike carbon/chromium (DLC/Cr), magnetron-sputtered graphite-like carbon/chromium (GLC/Cr), and magnetron-sputtered molybdenum disulphide/titanium (MoS₂/Ti) deposited on Ti-6Al-4V, Ti-48Al-2Cr-2Nb, and nickel-based superalloy 718. When TiC/Ti-6Al-4V was brought into contact with bare Ti-6Al-4V, bare Ti-48Al-2Cr-2Nb, and bare nickel-based superalloy 718, strong adhesion, severe galling, and severe wear occurred. However, when TiC/Ti-6Al-4V was brought into contact with MWNT, DLC/Cr, GLC/Cr, and MoS₂/Ti coatings, no galling occurred in the contact, and relatively minor wear was observed regardless of the coating. All the solid-film lubricants were effective from 296 to 523 K, but the effectiveness of the MWNT, DLC/Cr, GLC/Cr, and MoS₂/Ti coatings decreased as temperature increased.

Author

Low Cost; Titanium Carbides; Vanadium Alloys; Tribology; Aluminum Alloys; Wear Tests; Metal Matrix Composites; Solid Lubricants

20070012576 Sandia National Labs., Livermore, CA, USA

Formulation of a Crystal Plasticity Model

Marin, E. B.; Aug. 01, 2006; 62 pp.; In English

Report No.(s): DE2006-890604; SAND2006-4170; No Copyright; Avail.: Department of Energy Information Bridge

This report presents the formulation of a crystal elasto-viscoplastic model and the corresponding integration scheme. The model is suitable to represent the isothermal, anisotropic, large deformation of polycrystalline metals. The formulation is an extension of a rigid viscoplastic model to account for elasticity effects, and incorporates a number of changes with respect to a previous formulation (Marin & Dawson, 1998). This extension is formally derived using the well-known multiplicative decomposition of the deformation gradient into an elastic and plastic components, where the elastic part is additionally decomposed into the elastic stretch $V(\text{sup } e)$ and the proper orthogonal $R(\text{sup } e)$ tensors. The constitutive equations are written in the intermediate, stress-free configuration obtained by unloading the deformed crystal through the elastic stretch $V(\text{sup } e)$. The model is framed in a thermodynamic setting, and developed initially for large elastic strains. The crystal equations are then specialized to the case of small elastic strains, an assumption typically valid for metals. The developed integration scheme is implicit and proceeds by separating the spherical and deviatoric crystal responses. An 'approximate' algorithmic material moduli is also derived for applications in implicit numerical codes. The model equations and their integration procedure have been implemented in both a material point simulator and a commercial finite element code. Both implementations are validated by solving a number of examples involving aggregates of either face centered cubic (FCC) or hexagonal close-packed (HCP) crystals subjected to different loading paths.

NTIS

Crystals; Plastic Properties

20070012725 Westinghouse Savannah River Co., Aiken, SC, USA

Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report

Duncan, A. J.; Lam, P. S.; May 11, 2006; 32 pp.; In English

Contract(s)/Grant(s): DE-AC09-96SR18500

Report No.(s): DE2006-895632; WSRC-TR-2006-00180; No Copyright; Avail.: National Technical Information Service (NTIS)

The methods and interim results from a testing program to quantify hydrogen effects on mechanical properties of carbon steel pipeline and pipeline weld materials are provided. The scope is carbon steels commonly used for natural gas pipelines in the USA that are candidates for hydrogen service in the hydrogen economy. The mechanical test results will be applied in future analyses to evaluate service life of the pipelines. The results are also envisioned to be part of the bases for construction codes and structural integrity demonstrations for hydrogen service pipeline and vessels. Tensile properties of one type of steel

(A106 Grade B) in base metal, welded and heat affected zone conditions were tested at room temperature in air and high pressure (1500 psig) hydrogen. A general reduction in the materials ability to plastically deform was noted in this material when specimens were tested in 1500 psig hydrogen. Furthermore, the primary mode of fracture was changed from ductile rupture in air to cleavage with secondary tearing in hydrogen. The mechanical test program will continue with tests to quantify the fracture behavior in terms of J-R curves for these materials at air and hydrogen pressure conditions.

NTIS

Carbon Steels; High Pressure; Hydrogen; Pipelines

20070012783 Lawrence Livermore National Lab., Livermore, CA USA

Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys

Fix, D. V.; Rebak, R. B.; Feb. 07, 2006; 14 pp.; In English

Report No.(s): DE2006-894778; UCRL-PROC-218703; No Copyright; Avail.: Department of Energy Information Bridge

The ASTM standard B 575 provides the requirements for the chemical composition of Nickel-Chromium-Molybdenum (Ni-Cr-Mo) alloys such as Alloy 22 (N06022) and Alloy 686 (N06686). The compositions of each element are given in a range. For example, the content of Mo is specified from 12.5 to 14.5 weight percent for Alloy 22 and from 15.0 to 17.0 weight percent for Alloy 686. It was important to determine how the corrosion rate of welded plates of Alloy 22 using Alloy 686 weld filler metal would change if heats of these alloys were prepared using several variations in the composition of the elements even though still in the range specified in B 575. All the material used in this report were especially prepared at Allegheny Ludlum Co. Seven heats of plate were welded with seven heats of wire. Immersion corrosion tests were conducted in a boiling solution of sulfuric acid plus ferric sulfate (ASTM G 28 A) using both as-welded (ASW) coupons and solution heat-treated (SHT) coupons. Results show that the corrosion rate was not affected by the chemistry of the materials in the range of the standards.

NTIS

Corrosion; Fillers; Metal Plates; Metals; Welded Joints

20070012834 Eotvos Lorand Univ., Budapest, Hungary

Slip Activity in Commercial Purity Titanium (CP Ti)

Ungar, Tamas H; Sep 20, 2006; 19 pp.; In English

Contract(s)/Grant(s): FA8655-05-1-3004

Report No.(s): AD-A462958; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462958>

In the first delivery the microstructure of the CP-Ti specimen provided by The Metals Processing Group of Dr Lee Semiatin at the AF Research Laboratory in WPAFB, OH, was determined by X-ray line profile analysis (XLPA). In the second delivery About 12 smaller cubes were cut from the material by a diamond saw. Two deformation states were produced by the method of abc deformation, where the deformation stage was 10 and 20 % respectively. Four different kinds of X-ray diffraction experiments were carried out. High resolution laboratory and special synchrotron X-ray diffraction techniques were used to characterize slip and twinning activity in extruded billets of commercial-purity (CP) titanium.

DTIC

Purity; Titanium

20070013286 Universal Technology Corp., Dayton, OH USA

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint)

Jha, Sushant K; Laren, James M; Rosenberger, Andrew H; Feb 2006; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-M02R

Report No.(s): AD-A463514; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We have studied the effects of microstructure and temperature on the fatigue variability behavior of the alpha+beta titanium alloy, Ti-6Al2Zr-4Sn-6Mo (Ti-6-2-4-6). These variables had separate influence on the minimum, and the mean behavior. This was related to perhaps a fundamental aspect of fatigue variability which dictates that at any stress level, the mean is dominated by a mechanism different from the one controlling the lower-tail behavior. As a result in this material, while the mean response was increasingly dominated by the crack initiation regime with decreasing stress level (which is the conventionally expected behavior), at the same time the life-limiting behavior was controlled by the crack growth regime. This produced a very systematic effect of microstructure and temperature on total uncertainty in lifetime depending on the sensitivity of crack initiation and growth regimes to these variables. We suggest a new paradigm to treat the fatigue variability

behavior and show that, this can have significant implications for life management especially, with respect to reducing the uncertainty with life prediction and improving the reliability of design life.

DTIC

Life (Durability); Metal Fatigue; Microstructure; Predictions; Temperature Effects; Titanium Alloys; Variability

20070013314 Universal Technology Corp., Dayton, OH USA

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint)

Thomas, Jean-Philippe; Semiatin, S L; Sep 2006; 13 pp.; In English

Contract(s)/Grant(s): F33615-03-D-5801; Proj-4349

Report No.(s): AD-A463582; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Typical models of recrystallization based on the Avrami formulation cannot be applied to cases characterized by anisotropic material behavior (e.g., hot working of ingot structures) or several consecutive waves of partial dynamic and/or metadynamic recrystallization (as in multi-hit deformation). The primary processing of ingots by cogging poses challenges with regard to both of these aspects. The present work reports on a new meso-scale, mechanism-based model that has been developed for such problems and applied initially for Waspaloy. The model formulation comprises two main parts: a geometric framework and a set of equations that describe microstructure evolution due to the various driving forces. The geometric framework is based on so-called meso-structure units (MSUs), each of which represents an aggregate of similar grains. The MSUs evolve via nucleation-and-growth processes quantified by equations describing energy storage, nucleation, and grain-boundary migration. The model was tested on a prototypical cogging process using 3D-FEM simulations.

DTIC

Atmospheric Models; Heat Resistant Alloys; Ingots; Mesoscale Phenomena; Recrystallization; Simulation; Waspaloy

20070013364 Connecticut Univ., Storrs, CT USA

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint)

Song, Kai; Aindow, Mark; Jul 2006; 23 pp.; In English

Contract(s)/Grant(s): F33615-00-C-2-5216; Proj-K720

Report No.(s): AD-A463754; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The local grain boundary curvature in a model Ni-based superalloy was measured experimentally using Dehoff's tangent count method. The results show that, in materials containing significant amounts of second-phase particles, the curvature parameter κ , which relates the mean local curvature to the grain size, can adopt far lower values than have been reported previously. It is also shown that the value of κ , is not a constant, as is usually assumed, but instead varies both with the volume fraction of second-phase particles and with the holding time during high-temperature annealing. The lowest values for κ , were obtained for high particle volume fractions and long annealing times. Since the local boundary curvature constitutes the driving force for grain growth, these observations could help to explain grain growth phenomena in heavily pinned systems.

DTIC

Curvature; Grain Boundaries; Heat Resistant Alloys; Nickel Alloys; Tangents

20070013466 Naval Undersea Warfare Center, Newport, RI USA

System and Method of Use for Electrochemical Measurement of Corrosion

Skoorka Burgess, Michelle, Inventor; Feb 21, 2007; 17 pp.; In English; Original contains color illustrations

Report No.(s): AD-D020280; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A system and method of use is provided for using electrochemical impedance spectroscopy to determine the corrosion rates of coupled metals. Two dissimilar metals are coupled together and exposed to a saltwater electrolyte in an electrochemical cell. A variable frequency current is passed through the cell and collected at the coupled metals. The impedance and phase angle of the collected current data are plotted versus frequency. The plotted data are compared to and analogized to a known plot for physical electric circuits. When a matching plot and circuit are found, the corrosion rate data associated with the matched plot are used to determine the corrosion rates of the coupled metals.

DTIC

Corrosion; Electrochemical Cells; Electrochemical Corrosion; Impedance; Metals; Spectroscopy

20070013479 Southwest Research Inst., San Antonio, TX USA, Colorado School of Mines, Golden, CO USA
Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006

Arps, J.; Coulter, K.; Oct. 2006; 15 pp.; In English

Report No.(s): DE2006-894522; No Copyright; Avail.: National Technical Information Service (NTIS)

In the past quarter, we have conducted additional characterization and permeation tests on different Pd alloy membranes including PdCuTa ternary alloy materials. We attempted to address some discrepancies between SwRI and CSM relating to PdCu stoichiometry by preparing a range of PdCu membranes with compositions from approx. 58-65 at% Pd (bal. Cu). While some difficulties in cutting and sealing these thin membranes at CSM continue, some progress has been made in identifying improved membrane support materials. We have also completed an initial cost analysis for large-scale vacuum deposition and fabrication of thin Pd alloy membranes and project that the process can meet DOE cost targets. Minimal progress was made in the past quarter relating to the testing of prototype membrane modules at Idatech. In the past quarter Idatech was acquired by a UK investment firm, which we believe may have impacted the ability of key technical personnel to devote sufficient time to support this effort. We are hopeful their work can be completed by the end of the calendar year.

NTIS

Coal; Copper; Cost Effectiveness; Hydrogen; Hydrogen Production; Membranes; Palladium Alloys

20070013715 NASA Marshall Space Flight Center, Huntsville, AL, USA
Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr)

Lee, Jonathan A.; [2007]; 1 pp.; In English; 31st International Conference and Exposition on Advanced Ceramics and Composites, 21-26 Jan 2007, Daytona, FL, USA; No Copyright; Avail.: Other Sources; Abstract Only

In this paper the effect of nanoparticles Al₂O₃ and Al₃-X compounds (X= Ti, V, Zr) on the improvement of mechanical properties of aluminum alloys for elevated temperature applications is presented. These nanoparticles were selected based on their chemical stability and low diffusion rates in aluminum matrix at high temperatures. The strengthening mechanism for aluminum alloy is based on the mechanical blocking of dislocation movements by these nanoparticles. Samples were prepared from Al₂O₃ nanoparticle preforms, which were produced using ceramic injection molding process and pressure infiltrated by molten aluminum. Al₂O₃ nanoparticles can also be homogeneously mixed with aluminum powder and consolidated into samples through hot pressing and sintering. On the other hand, the Al₃-X nanoparticles are produced as precipitates via in situ reactions with molten aluminum alloys using conventional casting techniques. The degree of alloy strengthening using nanoparticles will depend on the materials, particle size, shape, volume fraction, and mean inter-particle spacing.

Author

Aluminum Alloys; Aluminum Oxides; High Temperature; Reaction Kinetics; Mechanical Properties; Nanoparticles

27

NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials*.

20070011526 Hoffmann and Baron, LLP, Syosset, NY, USA
Sidewall-Functionalized Carbon Nanotubes and Methods for making the Same

Wong, S. S.; Banerjee, S.; 3 Nov 03; 19 pp.; In English

Contract(s)/Grant(s): 22245; 24027

Patent Info.: Filed Filed 3 Nov 03; US-Patent-Appl-SN-10-701 402

Report No.(s): PB2007-103232; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The invention provides a method of functionalizing the sidewalls of a plurality of carbon nanotubes with oxygen moieties, the method comprising: exposing a carbon nanotube dispersion to an ozone/oxygen mixture to form a plurality of ozonized carbon nanotubes; and contacting the plurality of ozonized carbon nanotubes with a cleaving agent to form a plurality of sidewall-functionalized carbon nanotubes.

NTIS

Carbon Nanotubes; Methodology

20070011582 Lawrence Livermore National Lab., Livermore, CA USA

Silica Extraction at the Mammoth Lakes Geothermal Site

Bourcier, W.; Ralph, W.; Johnson, M.; Bruton, C.; Gutierrez, P.; Jun. 07, 2006; 8 pp.; In English

Report No.(s): DE2006-893986; UCRL-PROC-224426; No Copyright; Avail.: National Technical Information Service (NTIS)

The purpose of this project is to develop a cost-effective method to extract marketable silica (SiO₂) from fluids at the Mammoth Lakes, California geothermal power plant. Marketable silica provides an additional revenue source for the geothermal power industry and therefore lowers the costs of geothermal power production. The use of this type of 'solution mining' to extract resources from geothermal fluids eliminates the need for acquiring these resources through energy intensive and environmentally damaging mining technologies. We have demonstrated that both precipitated and colloidal silica can be produced from the geothermal fluids at Mammoth Lakes by first concentrating the silica to over 600 ppm using reverse osmosis (RO). The RO permeate can be used in evaporative cooling at the plant; the RO concentrate is used for silica and potentially other (Li, Cs, Rb) resource extraction. Preliminary results suggest that silica recovery at Mammoth Lakes could reduce the cost of geothermal electricity production by 1.0 cents/kWh.

NTIS

Extraction; Lakes; Silicon Dioxide

20070011594 Intelligent Automation Systems, Inc., Rockville, MD, USA, Naval Research Lab., Stennis Space Center, MS, USA

Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method

Mi, B.; Zhao, G.; Bayles, R.; January 2006; 8 pp.; In English

Report No.(s): DE2006-894176; No Copyright; Avail.: National Technical Information Service (NTIS)

Thermal spray coating is usually applied through directing molten or softened particles at very high velocities onto a substrate. An eddy current non-destructive inspection technique is presented here for thermal spray coating interface quality characterization. Several high-velocity-oxy-fuel (HVOF) coated steel plates were produced with various surface preparation conditions or spray process parameters. A quad-frequency eddy current probe was used to manually scan over the coating surface to evaluate the bonding quality. Experimental results show that different surface preparation conditions and varied process parameters can be successfully differentiated by the impedance value observed from the eddy current probe. The measurement is fairly robust and consistent. This non-contact, nondestructive, easy-to-use technique has the potential for evaluating the coating quality immediately after its application so that any defects can be corrected immediately.

NTIS

Bonding; Coating; Eddy Currents; Nondestructive Tests; Sprayers

20070011669 Lawrence Livermore National Lab., Livermore, CA USA

Plasticity Integration Algorithm Motivated by Analytical Integration of a Generalized Quadratic Function

Becker, R.; Mar. 06, 2006; 10 pp.; In English

Report No.(s): DE2006-893998; UCRL-TR-219523; No Copyright; Avail.: National Technical Information Service (NTIS)

The goal is to examine the dependence of the plastic flow direction as a function of strain increment for a generalized quadratic flow potential; and from that, extract a scheme for constructing a plastic flow direction for a more general class of yield and flow surfaces.

NTIS

Measure and Integration; Plastic Flow; Plastic Properties

20070012918 Johns Hopkins Univ., Baltimore, MD USA

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer

Zhou, Qun; Jun 2005; 33 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0376

Report No.(s): AD-A463104; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463104>

The important role of polyamine in regulation of cell growth has led to the development of a number of polyamine analogues that can intervene in natural polyamine metabolism and inhibit the growth of tumor cells. This proposal was designed to elucidate the molecular mechanisms and the therapeutic efficacy of a new generation of polyamine analogues in treatment of human breast cancer. In the second year of this award, we demonstrated that activation of p53/p21 is important

for the induction of polyamine analogue-induced growth inhibition and apoptosis. In our latest studies, we demonstrated that oligoamines specifically suppress the gene expression and function of the estrogen receptor alpha (ERalpha), a principal determinant of breast cell growth and differentiation, leading to the subsequent down-regulation of ERalpha-target genes. Simultaneous treatment with spermine could significantly reverse analogue-induced downregulation of ER expression and activity, suggesting that natural polyamines play an important role in maintaining normal ER activity. We also demonstrated that oligoamines inhibit the ERalpha promoter element, which contains the GC and C/A rich boxes bound by Sp1 transcription factor family. Moreover, ERalpha has been observed to be an important mediator of the effects of the transcription factor NF-kB in response to analogue. These preliminary data indicate the possibility of a novel regulation of estrogen signaling by polyamine analogues.

DTIC

Analogues; Apoptosis; Breast; Cancer; Mammary Glands; Polymers

20070013287 Massachusetts Univ., Amherst, MA USA

Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics

Karasz, Frank E; Feb 1, 2007; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-06-1-0040

Report No.(s): AD-A463515; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The electroluminescence of a number of conjugated macromolecules has been studied with particular reference to finding systems with high quantum yields. Various strategies have been investigated to optimize the light output from devices incorporating these polymers. The program included complementary studies of relevant optical and other physical properties of these materials.

DTIC

Conjugation; Electroluminescence; Electro-Optics; Lasing; Light Transmission

20070013302 Catawba Resources, Stow, OH USA

Geopolymers for Structural Ceramic Applications

Comrie, Douglas C; Aug 31, 2006; 145 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-C-0063

Report No.(s): AD-A463559; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Geopolymers show promise in a variety of structural ceramic based application including refractory adhesives for ceramics and metals, thermal shock resistant molds, fiber reinforced composites, and as a precursor in the formation of pure ceramic phases such as leucite ($\text{KA1Si}(\text{sub } 2)\text{O}(\text{sub } 6)$) and pollucite ($\text{CsA1Si}(\text{sub } 2)\text{O}(\text{sub } 6)$) with tailorable porosity and thermal expansion. In this work, the scientific details of using geopolymers in these emerging areas were explored via mechanical and structural testing, and within an industrial setting. A variety of techniques including shear strength testing, microstructural analysis, laser scanning confocal microscopy, and X-ray analysis were to characterize fabricated materials. As adhesives, geopolymers were effectively used to bond low-carbon steel and borosilicate glass at ambient and elevated temperatures (450 degrees C). The steel/geopolymer bonds had shear strengths between 2 - 3 MPa while the borosilicate/geopolymer bond strength was undetermined; during testing, fracture occurred within the glass itself, not within the geopolymer bond or at the interlace.

DTIC

Ceramics; Fabrication; Fiber Composites; Graphite; Structural Design; Synchrotron Radiation; Thermal Expansion

20070013519 General Electric Co., Schenectady, NY, USA

Thermal Barrier Coating

Carolia, R.; Spitsbery, I.; Boutwell, B. A. R.; Gorman, M. D.; Johnson, C. A.; 26 Nov 03; 12 pp.; In English

Contract(s)/Grant(s): NAWCR-N00421-00-3-0443

Patent Info.: Filed Filed 26 Nov 03; US-Patent-Appl-SN-10-707-197

Report No.(s): PB2007-101647; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A thermal barrier coating (TBC) for a component intended for use in a hostile thermal environment. The TBC has an interior region and an outer surface region on and contacting the interior region. Both regions are formed of a ceramic material, with the interior region having a lower thermal conductivity than zirconia partially stabilized by about seven weight percent yttria. The interior region constitutes more than half of the thickness of the TBC, and the outer surface region constitutes less than half of the thickness of the TBC. The TBC has a columnar microstructure whereby the interior region and the outer

surface region comprise columns of their ceramic materials. The outer surface region is more erosion and impact resistant than the interior region at least in part as a result of the columns thereof being more closely spaced than the columns of the interior region.

NTIS

Protective Coatings; Thermal Conductivity; Thermal Control Coatings

20070013533 Plasmelt Glass Technologies, LLC, Boulder, CO, USA

High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06

Hayward, J. K.; Parker, S.; Kirkland, R.; Oct. 2006; 39 pp.; In English

Report No.(s): DE2006-894643; No Copyright; Avail.: Department of Energy Information Bridge

The purpose of this project was to demonstrate the energy efficiency and reduced emissions that can be obtained with a dual torch DC plasma transferred arc-melting system. Plasmelt Glass Technologies, LLC was formed to solicit and execute the project, which utilize a full-scale test melter system. The system is similar to the one that was originally constructed by Johns Manville, but Plasmelt has added significant improvements to the torch design and melter system that has extended the original JM short torch lives. The original JM design has been shown to achieve melt rates 5 to 10 times faster than conventional gas or electric melting, with improved energy efficiency and reduced emissions. This project began on 7/28/2003 and ended 7/27/06. A laboratory scale melter was designed, constructed, and operated to conduct multiple experimental melting trials on various glass compositions. Glass quality was assessed. Although the melter design is generic and equally applicable to all sectors within the glass industry, the development of this melter has focused primarily on fiberglass with additional exploratory melting trials of frits, specialty, and minerals-melting applications. Throughput, energy efficiency, and glass quality have been shown to be heavily dependent on the selected glass composition.

NTIS

Glass; Melting; Plasmas (Physics); Energy Conservation

20070013692 NASA White Sands Test Facility, NM, USA

Microgravity Effects on Combustion of Polymers

Hirsch, David; Williams, Jim; Beeson, Harold; March 2007; 6 pp.; In English; Aerospace Testing Conference Expo 2007, 27-29 Mar. 2007, Munich, Germany; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013692>

A viewgraph presentation describing various microgravity effects on the combustion of polymers is shown. The topics include: 1) Major combustion processes and controlling mechanisms in normal and microgravity environments; 2) Review of some buoyancy effects on combustion: melting of thermoplastics; flame strength, geometry and temperature; smoldering combustion; 3) Video comparing polymeric rods burning in normal and microgravity environments; and 4) Relation to spacecraft fire safety of current knowledge of polymers microgravity combustion.

CASI

Combustion Physics; Microgravity; Polymers

20070013693 Transportation Research Board, Washington, DC, USA, Florida Atlantic Univ., Boca Raton, FL, USA

Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement

Akbar, A.; Scannell, W. T.; Hartt, W. H.; Aug. 2002; 192 pp.; In English

Report No.(s): PB2007-106724; NCHRP-50; Copyright; Avail.: National Technical Information Service (NTIS)

The primary goal of this effort was to address the anticipated need for premature repair and rehabilitation of concrete bridge elements containing epoxy-coated rebar (ECR). Laboratory, test yard, and field studies were conducted to evaluate and validate applicable strategies. The performance of each strategy was judged by the level of corrosion protection afforded in and outside the repair area. Based on the results of this effort, credible information available in literature, and the collective experience of the research team, a decision matrix was developed. The decision matrix matches appropriate repair and rehabilitation strategies to the damage mode, present condition, environmental exposure, and future propensity of corrosion. The evaluation of strategies was subdivided into two categories, one applicable to the mitigation of corrosion in cracks and the other to delaminations and spalls. Several possible combinations of an epoxy injection material and two corrosion inhibitors were evaluated for corrosion mitigation in both corrosion and non-corrosion induced cracks. Injection of cracks was accomplished using bisphenol A and polyamine curing agent. Of the two surface applied (migrating) corrosion inhibitors used, one contained water based amine and an oxygenated hydrocarbon and the other contained calcium nitrite as the active agent. None of the repair strategies evaluated in this category exhibited any ability to provide protection against corrosion in the two

spheres of interest; that is, 1) directly at the crack and 2) area adjacent to the cracks. Various combinations of three patch materials (pre-bagged Portland cement concrete, pre-bagged polymer modified silica fume concrete, and Class III Portland cement concrete), three rebar coatings (epoxy coating, water based epoxy resin/Portland cement coating, and water based alkaline coating with corrosion inhibitor), and four corrosion inhibitors (water based amine and an oxygenated hydrocarbon migrating corrosion inhibitor, water based amine and an oxygenated hydrocarbon admixture, calcium nitrite admixture, and a multi-component corrosion inhibitor and concrete densifier admixture) were used in the evaluation of repair strategies applicable to delaminations and spalls.

NTIS

Epoxy Resins; Protective Coatings; Bridges (Structures); Concrete Structures; Composite Materials

28

PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels. For nuclear fuels see 73 *Nuclear Physics*. For related information see also 07 *Aircraft Propulsion and Power*; 20 *Spacecraft Propulsion and Power*; and 44 *Energy Production and Conversion*.

20070011604 Utah Univ., Salt Lake City, UT USA

Effects of Finite Sample Width on Transition and Flame Spread in Microgravity

Mell, W E; Kashiwagi, T; Proceedings of the Combustion Institute; Aug. 2000; 28, pp. 2785-2792; In English; International Symposium on Combustion (28th), 30 Jul. - 4 Aug. 2000, Edinburgh, UK; Original contains color illustrations

Contract(s)/Grant(s): C-32001-R

Report No.(s): AD-A453866; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/100.2/ADA453866>

In most microgravity studies of flame spread, the flame is assumed to be two-dimensional, and two-dimensional models are used to aid data interpretation. However, since limited space is available to microgravity facilities, the flames are limited in size. It is important, therefore, to investigate the significance of three-dimensional effects. Three-dimensional and two-dimensional simulations of ignition and subsequent transition to flame spread were performed on a thermally thin cellulosic sample. Ignition occurred by applying a radiant heat flux in a strip across the center of the sample. The sample was bounded by an inert sample holder. Heat loss effects at the interface of the sample and the sample holder were tested by varying the thermal-physical properties of the sample holder. Simulations were also conducted with samples of different widths and with different ambient wind speeds (i.e., different levels of oxygen supply). The width of the sample affected both the duration of the flame transition period and the post-transition flame spread rate. Finite width effects were most significant when the ambient wind was relatively small (limited oxygen supply). In such environments, the velocity due to thermal expansion reduced the net inflow of oxygen enough to significantly affect flame behavior. For a given sample width, the influence of thermal expansion on the net incoming oxygen supply decreased as the ambient wind speed increased. Thus, both the transition and flame spread behavior of the three-dimensional flame (along the centerline) tended to that of the two-dimensional flame with increasing ambient wind speed. Heat losses to the sample holder were found to affect the flame spread rate in the case of the narrowest sample with the slowest ambient wind.

Author

Flame Propagation; Microgravity; Simulation

20070012914 Naval War Coll., Newport, RI USA

The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil

Angove, Michael D; May 17, 2005; 25 pp.; In English

Report No.(s): AD-A463098; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463098>

There is much discussion today about the problems of oil consumption and energy security. Since 1980, U.S. policy has been to ensure the free-flow of oil out of the Middle East region using force when necessary. This has resulted in heightened anti-American sentiment in the region, most notably among radical Islamist groups such as al Qaeda. There are additional problems with continuing to support an oil-based economy including diminishing supplies and detrimental climate implications. America's oil dependence cannot be myopically viewed as either an economic issue, a stability issue, a terrorism issue, or an environmental issue. These factors must be looked at cumulatively, and when they are a National Security Crisis emerges. America now has the choice of continuing to defend its access to the world's oil reserves, and face the consequences,

or to move boldly toward an alternative. An aggressive public-private investment in the Hydrogen Economy offers just such an alternative.

DTIC

Oils; Security; United States; Warfare

20070013147 Air Force Logistics Management Center, Gunter AFS, AL USA

Air Force Journal of Logistics. Volume 30, Number 3, Fall 2006

Jan 2006; 88 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462911; No Copyright; Avail.: CASI: [A05](#), Hardcopy

The main article in this issue is entitled 'War Without Oil.' On 31 January 2006, President Bush pronounced in his annual State of the Union Address, that 'America is addicted to oil.' and that the key to eliminating US dependence on foreign energy was through the application of breakthrough technologies as part of this Advanced Energy Initiative (AEI). Focused on revolutionizing energy sources and used for facilities and automotive applications, the President proposed increasing Department of Energy (DoE) research and development (R&D) funding by 22 percent to accelerate technologies in clean coal consumption, nuclear energy, solar, wind, biofuel renewables, hybrids, and fuel-cells in order to move beyond a petroleum-based economy. The President's AEI represents one of the numerous energy independence proposals to surface on the nation's agenda since the Arab oil embargo of 1973. Despite decades of effort by government institutions, industry, and academia to free America of its petroleum addiction, the simple fact is that over the last 30 years American oil consumption has increased by one-third and imports have more than doubled. By 2025 the Energy Information Agency predicts that Americans will be importing 68 percent of their petroleum needs. Other articles concern contemporary issues such as risk analysis, history of logistics.

DTIC

Fuels; Logistics; Oils

20070013734 NASA Marshall Space Flight Center, Huntsville, AL, USA

Bismuth Propellant Feed System Development at NASA-MSFC

Polzin, Kurt A.; [2007]; 2 pp.; In English; Original contains black and white illustrations; No Copyright; Avail.: CASI:

[A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013734>

NASA-MSFC has been developing liquid metal propellant feed systems capable of delivering molten bismuth at a prescribed mass flow rate to the vaporizer of an electric thruster. The first such system was delivered to NASA-JPL as part of the Very High Isp Thruster with Anode Layer (VHITAL) program. In this system, the components pictured were placed in a vacuum chamber and heated while the control electronics were located outside the chamber. The system was successfully operated at JPL in conjunction with a propellant vaporizer, and data was obtained demonstrating a new liquid bismuth flow sensing technique developed at MSFC. The present effort is aimed at producing a feed-system for use in conjunction with a bismuth-fed Hall thruster developed by Busek Co. Developing this system is more ambitious, however, in that it is designed to self-contain all the control electronics inside the same vacuum chamber as an operating bismuth-fed thruster. Consequently, the entire system, including an on-board computer, DC-output power supplies, and a gas-pressurization electro-pneumatic regulator, must be designed to survive a vacuum environment and shielded to keep bismuth plasma from intruding on the electronics and causing a shortcircuit. In addition, the hot portions of the feed system must be thermally isolated from the electronics to avoid failure due to high heat loads. This is accomplished using a thermal protection system (TPS) consisting of multiple layers of aluminum foil. The only penetrations into the vacuum chamber are an electrically isolated (floating) 48 VDC line and a fiberoptic line. The 48 VDC provides power for operation of the power supplies and electronics co-located with the system in the vacuum chamber. The fiberoptic Ethernet connection is used to communicate user-input control commands to the on-board computer and transmit real-time data back to the external computer. The partially assembled second-generation system is shown. Before testing at Busek, a more detailed flow sensor calibration will be performed to accurately quantify the flow monitoring capabilities. This effort is funded under a Technology Innovation Program (TIP) award from NASA-MSFC's Technology Transfer office and performed under SAA8-061060.

Author

Bismuth; Feed Systems; Systems Engineering; Metal Propellants

SPACE PROCESSING

Includes space-based development of materials, compounds, and processes for research or commercial application. Also includes the development of materials and compounds in simulated reduced-gravity environments. For legal aspects of space commercialization see *84 Law, Political Science and Space Policy*.

20070011621 NASA Johnson Space Center, Houston, TX, USA

The International Space Station as a Research Laboratory: A View to 2010 and Beyond

Uri, John J.; [2007]; 1 pp.; In English; 58th International Astronautical Congress, 24-28 Sep. 2007, Hyderabad, India; No Copyright; Avail.: Other Sources; Abstract Only

Assembly of International Space Station (ISS) is expected to be complete in 2010, with operations planned to continue through at least 2016. As we move nearer to assembly complete, replanning activities by NASA and ISS International Partners have been completed and the final complement of research facilities on ISS is becoming more certain. This paper will review plans for facilities in the US On-orbit Segment of ISS, including contributions from International Partners, to provide a vision of the research capabilities that will be available starting in 2010. At present, in addition to research capabilities in the Russian segment, the USA Destiny research module houses nine research facilities or racks. These facilities include five multi-purpose EXPRESS racks, two Human Research Facility (HRF) racks, the Microgravity Science Glovebox (MSG), and the Minus Eighty-degree Laboratory Freezer for ISS (MELFI), enabling a wide range of exploration-related applied as well as basic research. In the coming years, additional racks will be launched to augment this robust capability: Combustion Integrated Rack (CIR), Fluids Integrated Rack (FIR), Window Observation Rack Facility (WORF), Microgravity Science Research Rack (MSRR), Muscle Atrophy Research Exercise System (MARES), additional EXPRESS racks and possibly a second MELFI. In addition, EXPRESS Logistics Carriers (ELC) will provide attach points for external payloads. The European Space Agency's Columbus module will contain five research racks and provide four external attach sites. The research racks are Biolab, European Physiology Module (EPM), Fluid Science Lab (FSL), European Drawer System (EDS) and European Transport Carrier (ETC). The Japanese Kibo elements will initially support three research racks, Ryutai for fluid science, Saibo for cell science, and Kobairo for materials research, as well as 10 attachment sites for external payloads. As we look ahead to assembly complete, these new facilities represent a threefold increase from the current research laboratory infrastructure on ISS. In addition, the increase in resident crew size will increase from three to six in 2009, will provide the long-term capacity for completing research on board ISS. Transportation to and from ISS for crew and cargo will be provided by a fleet of vehicles from the USA, Russia, ESA and Japan, including accommodations for thermally-conditioned cargo. The completed ISS will have robust research accommodations to support the multidisciplinary research objective of scientists worldwide.

Author

International Space Station; Multidisciplinary Research; Research Facilities; NASA Space Programs

20070011647 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Standardizing an End-to-end Accounting Service

Greenberg, Edward; Kazz, Greg; June 20, 2006; 8 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), June 19-24, 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.:

Other Sources

ONLINE: <http://hdl.handle.net/2014/39844>

Currently there are no space system standards available for space agencies to accomplish end-to-end accounting. Such a standard does not exist for spacecraft operations nor for tracing the relationship between the mission planning activities, the command sequences designed to perform those activities, the commands formulated to initiate those activities and the mission data and specifically the mission data products created by those activities. In order for space agencies to cross-support one another for data accountability/data tracing and for inter agency spacecraft to interoperate with each other, an international CCSDS standard for end-to-end data accountability/tracing needs to be developed. We will first describe the end-to-end accounting service model and functionality that supports the service. This model will describe how science plans that are ultimately transformed into commands can be associated with the telemetry products generated as a result of their execution. Moreover, the interaction between end-to-end accounting and service management will be explored. Finally, we will show how the standard end-to-end accounting service can be applied to a real life flight project i.e., the Mars Reconnaissance Orbiter project.

Author

Mission Planning; Accounting; Standardization; Telemetry

20070013520 NASA Glenn Research Center, Cleveland, OH, USA

Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity

Alford, J. M.; Mason, G. R.; Feikema, D. A.; [2006]; 26 pp.; In English; 44th AIAA Aerospace Sciences Meeting and Exhibit, 9-12 Jan. 2006, Reno, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): NAS3-99142; WBS 519205.02.02; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013520>

Although many methods are available for producing single-walled carbon nanotubes (SWNTs), the conventional carbon arc process remains the most popular due to its simplicity and large production rate. In the carbon arc, SWNTs are catalytically synthesized by rapidly evaporating a graphite anode impregnated with NiN metal catalyst from which the nanotubes grow in an inert atmosphere. However, high temperatures inside the carbon arc generate strong buoyancy driven convection, and it is hypothesized that the non-uniform environment created by this flow has a large effect on the growth and morphology of the SWNTs. To study the effect of buoyancy on the arc process, a miniature carbon arc apparatus was developed to synthesize SWNTs in a microgravity environment substantially free from these strong convective flows. The reactor was operated for either 2.2 or 5 seconds during free-fall in the drop towers at the NASA Glenn Research Center. Two apparatus designs differing mainly in their production rate and power capacity were investigated. The first consisted of a miniaturized carbon arc employing a 1 mm diameter graphite anode and powered by a 0.54 F capacitor bank charged to 65 V. The second, larger apparatus employed a 4 mm diameter anode and was powered by a portable battery pack capable of providing in excess of 300 amps at 30 volts to the arc for the duration of a 5 second drop. Initial results indicated that transient heating is a very large effect in the short-duration drop tower carbon arcs, and thermal equilibrium of the arc plasma, buffer gas, and apparatus was not attained during the short microgravity periods. In addition, removal of the buoyant convection by the microgravity now allowed clear observation of large jets of evaporated carbon vapor streaming from the anode and mixing with the inert buffer gas. The initial mixing of these jets with the cold buffer gas combined with the thermal transient made it difficult to establish a uniform high temperature environment around the arc in the 2.1 to 5 second microgravity time interval, and even with a very high-powered arc, the arc region was cooler than in continuously operated arcs. Despite these difficulties, the miniature arc produced SWNTs in microgravity. However, given the large thermal transient to overcome, no dramatic difference in sample yield or composition was noted between normal gravity and 2-, and 5-second long microgravity runs.

Author

Carbon Arcs; Carbon Nanotubes; High Temperature; Microgravity; Nanostructure Growth

31

ENGINEERING (GENERAL)

Includes general research topics related to engineering and applied physics, and particular areas of vacuum technology, industrial engineering, cryogenics, and fire prevention. For specific topics in engineering see *categories 32 through 39*.

20070012850 Massachusetts Univ., Lowell, MA USA

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band

Gatesman, A J; Goyette, T M; Dickinson, J C; Giles, R H; Waldman, J; Sizemore, J; Chase, R M; Nixon, W E; May 2005; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DASC-01-01-C-0011

Report No.(s): AD-A462978; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462978>

The HH and VV-polarized backscattering behavior of homogeneous ground clutter was investigated by measuring the radar cross section per unit area of rough surface terrain. The behavior of X, Ka, and W bands was investigated by analyzing ISAR imagery of 1/16th scale terrain collected in compact radar ranges operating at 160 GHz, 520 GHz, and 1.56 THz. An array of 27 ground planes was fabricated for the clutter study. Nine ground planes were required per radar band for modeling three roughness values and three soil water contents. In addition to studying terrain backscatter as a function of surface roughness, the dependence on soil moisture content also was characterized by tailoring the dielectric constant of the scale models. The radar cross section per unit illuminated area was calculated as a function of elevation angle between 15 degrees and 75 degrees. The results of this work were used in the fabrication of scale model ground planes for the collection of radar imagery from scaled threat targets situated in realistic environments. Backscattering data are presented and compared to clutter data found in the literature. A strong polarization dependence, in agreement with field measurements, was observed in the X-band backscatter data for the smoothest surface in the collection. All data, in general, were in excellent agreement with clutter data found in the literature indicating that millimeter-wave and microwave backscatter behavior from homogeneous

terrain can be accurately modeled using physical scale modeling techniques.

DTIC

Backscattering; Clutter; Extremely High Frequencies; Ground Effect (Communications); Moisture Content; Polarimetry; Radar Cross Sections; Scale Models; Soils; Superhigh Frequencies; Surface Roughness; Terrain Analysis

20070012851 Massachusetts Univ., Lowell, MA USA

Classification of Targets Using Optimized ISAR Euler Imagery

Baird, Christopher; Kersey, W T; Giles, R; Nixon, W E; May 2006; 12 pp.; In English

Report No.(s): AD-A462979; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462979>

Various approaches exist to enable target classification through a decomposition of the polarimetric scattering matrix. Specifically, the Euler decomposition attempts to express the target scattering properties through more physically relevant parameters. Target classification in general has been limited by signature variability and the saturation of images by non-persistent scatterers. The Euler decomposition is sensitive to additional parameter ambiguities. It will be demonstrated how undesirable ambiguities may be identified and mitigated. Through the analysis of polarimetric ISAR signatures obtained in compact radar ranges at the University of Massachusetts Lowell Submillimeter Technology Laboratory and the U.S. Army National Ground Intelligence Center (NGIC), the cause of non-persistent scatters will be investigated. A proper characterization of non-persistence should lead to better optimization of the Euler decomposition, and thus improve target classification.

DTIC

Ambiguity; Classifications; Decomposition; Differential Equations; Electromagnetic Scattering; Extremely High Frequencies; Imagery; Polarimetry; Radar Signatures; Targets

20070012852 Massachusetts Univ., Lowell, MA USA

Exploitation of ISAR Imagery in Euler Parameter Space

Baird, Christopher; Kersey, W T; Giles, R; Nixon, W E; May 2005; 13 pp.; In English

Report No.(s): AD-A462980; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462980>

Efforts are being made to exploit the full-polarimetric radar scattering nature of ground targets to extract maximum information, enabling target identification and classification. These efforts have taken varied approaches to decomposing the polarimetric scattering matrix into more meaningful, phenomenological parameter spaces. The Euler parameters have potential value in target classification but have historically met with limited success due to ambiguities that arise in decomposition as well as the parameters' sensitivity to noise and target movement. Using polarimetric ISAR signatures obtained from stationary targets in compact radar ranges at the University of Massachusetts Lowell Submillimeter Technology Laboratory and the U.S. Army National Ground Intelligence Center (NGIC), correlation studies were performed in the Euler parameter space to assess its impact on improving target classification. Methods for deriving explicit transform equations that minimize ambiguities will be presented, as will the results of the correlation studies.

DTIC

Ambiguity; Classifications; Correlation; Differential Equations; Electromagnetic Scattering; Exploitation; Extremely High Frequencies; Imagery; Polarimetry; Radar Imagery; Targets

20070012889 Texas Univ. at Dallas, Richardson, TX USA

Comparing Evaluation Metrics for Sentence Boundary Detection

Liu, Yang; Shriberg, Elizabeth; Jan 2007; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): HR0011-06-C-0023

Report No.(s): AD-A463058; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463058>

In recent NIST evaluations on sentence boundary detection, a single error metric was used to describe performance. Additional metrics, however, are available for such tasks, in which a word stream is partitioned into subunits. This paper compares alternative evaluation metrics including the NIST error rate, classification error rate per word boundary, precision and recall, ROC curves, DET curves, precision-recall curves, and area under the curves and discusses advantages and disadvantages of each. Unlike many studies in machine learning, we use real data for a real task. We find benefit from using curves in addition to a single metric. Furthermore, we find that data skew has an impact on metrics, and that differences among

different system outputs are more visible in precision-recall curves. Results are expected to help us better understand evaluation metrics that should be generalizable to similar language processing tasks.

DTIC

Boundaries; Evaluation; Linguistics; Natural Language Processing; Sentences; Speech Recognition; System Effectiveness

20070012917 Air Force Research Lab., Hanscom AFB, MA USA

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint)

Chiu, Yu-hui; Austin, Brad L; Williams, Skip; Dressier, Rainer A; Karabadzhak, George F; Jun 9, 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A463101; AFRL-VS-HA-TR-2007-1007; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463101>

This paper presents a set of xenon apparent emission excitation cross sections for emission lines that have diagnostic value in the analysis of Xe-propelled Hall thruster plasmas. Emission cross sections are presented for three excitation processes involving ground-state xenon atoms: $e^- + \text{Xe}$, $\text{Xe}^+ + \text{Xe}$, and $\text{Xe}^{2+} + \text{Xe}$. The cross sections are derived from luminescence spectra produced at single-collision conditions. Apparent emission excitation cross sections are tabulated for 12 visible and 8 near-infrared lines for electron energies ranging from 10 to 70 eV. In case of the near-infrared lines, radiation trapping effects are accounted for by measuring the detailed pressure dependence of the apparent emission cross sections and extrapolating to zero pressure. A semiempirical expression for the pressure dependence is derived that allows zero-pressure extrapolation from threshold to 70 eV. Ion-induced cross sections are reported for the same emission lines at an energy per unit charge E/q of 300 eV, chosen for typical Hall thruster operating voltages. Radiation trapping effects are negligible for the ion emission excitation cross sections between 0.1 and 2.0 mTorr in the present luminescence experiment.

DTIC

Electric Propulsion; Hall Thrusters

20070013171 Cincinnati Univ., OH USA

Emissions Control in Swirl Stabilized Spray Combusters, an Experimental and Computational Study

Gutmark, Ephraim; Feb 1, 2007; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0837

Report No.(s): AD-A463219; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Detailed measurements of velocity statistics, temperature distribution, flame chemiluminescence, and emission characteristics in a lean direct fuel injection multi swirl gas turbine combustor were acquired. The inlet and exit boundary conditions, including the mixing tube length and the exhaust nozzle contraction ratio, were modified to emphasize the effects of these boundary conditions on the characteristics of nonreacting and reacting flows. Velocity statistics, including mean and turbulence kinetics, were measured by using SPIV in a cylindrical combustor chamber for isothermal and reacting flow cases. The velocity spectra at different locations were measured using hot-wire anemometry. The temperature distribution along the combustor radial direction was measured using thermocouples at different axial locations for a variety of multi-swirl configurations. The exhaust emissions of NO_x and CO were measured as a function of fuel/air ratio. The data along with the detailed description of the experimental setup and operating conditions can be used to validate modeling approaches to swirling flows, the turbulence/chemistry interaction.

DTIC

Combustion Chambers; Fuel-Air Ratio; Gas Turbines; Sprayers

20070013590 Defence Research and Development Canada, Ottawa, Ontario Canada

Trials Lessons Learned: DRDC Ottawa Propagation Measurements and Support for DLCSPM Trials 9-10 January 06

Charland, Shawn; Aug 2006; 43 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462975; DRDC-CR-2006-207; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462975>

This report presents a brief summary of lessons learned from experimental field trials conducted by Defense Research and Development Agency-Ottawa (DRDC Ottawa) from September 2005 to January 2006. The purpose of this report is to provide a record of trials-related issues and related procedural solutions which were found to work well, in order to advise the planning of similar future trials. Thirteen separate items of advice are presented to improve confidence of success and efficiency,

including inexpensive protection of test equipment from extreme cold, the use of visual signaling methods when radio communication is not possible, and the use of generators to provide electrical power at remote locations.

DTIC

Field Tests; Test Equipment

32

COMMUNICATIONS AND RADAR

Includes radar; radio, wire, and optical communications; land and global communications; communications theory. For related information see also 04 Aircraft Communications and Navigation; and 17 *Space Communications, Spacecraft Communications, Command and Tracking*; for search and rescue, see 03 *Air Transportation and Safety*, and 16 *Space Transportation and Safety*.

20070011447 Texas Univ., Austin, TX USA

The Communications of Influence through Technology-Enabled Media

Turner, Jason M; Dec 2006; 303 pp.; In English

Report No.(s): AD-A462849; CI07-0017; No Copyright; Avail.: CASI: [A14](#), Hardcopy

Theory and research regarding interpersonal influence and communication media have conceptualized both in terms of contextual or a priori factors, situated action and interaction, or behavioral outcomes. Given the primacy of influence in collective action and the increasingly pervasive role communication technologies play in organizational settings, the goal of this study was to examine the relationships between influence and media from all three perspectives. Perceptions of the context of media use in collaborative settings were described using self-guided focus groups and survey response data. A series of structured group experiences was then administered to create a collaborative problem-solving environment using one of three media capabilities: face-to-face, voice conference, and chat. Behavioral indices of influence were recorded during the structured group experiences to explore effects attributable to media. Finally, in-depth perceptual data was collected through semi-structured interviews to determine how media in use during the structured group experiences impacted interpersonal influence and the context in which that influence was expressed.

DTIC

Telecommunication; Voice Communication; Conferences

20070011506 Lads and Parry, Los Angeles, CA, USA

Randomized Distributed Network Coding

Effros, M.; Ho, T.; Karger, D.; Koetter, R.; Medard, M.; 17 Nov 04; 28 pp.; In English

Contract(s)/Grant(s): CCR-0325324; CCR-0220039

Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-992 463

Report No.(s): PB2007-103293; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A network and a method for transmitting processes in a network are disclosed, where a randomized coding approach is provided. Network nodes transmit on each outgoing link a linear combination of incoming signals, specified by independently and randomly chosen code coefficients from a finite field. The approach allows robust, distributed transmission and compression of information in networks and is advantageous over routing-based approaches.

NTIS

Coding; Computer Networks; Distributed Processing

20070011545 Japan Aerospace Exploration Agency, Tokyo, Japan

Performance Evaluation of 'SRFS on Ether' on the Internet

Mar. 2006; 16 pp.; In Japanese

Report No.(s): PB2007-103371; No Copyright; Avail.: National Technical Information Service (NTIS)

SRFS on Ether adds an ethernet interface to the Shared Rapid File System (SRFS) that is currently used as a distributed file system between nodes by the high performance computing (HPC) system of JAXA (NS III). It can be used like the network file system (NFS) and has solved the problem of data coherency in the high-speed transmission of data in a broadband environment, which the NFS has not. Moreover, adjustment of the TCP/IP parameter in the OS to improve speed is unnecessary, and special hardware is not needed, unlike with the SAN construction by iFCP etc., so the cost of introduction can be held down. In this report, we measured the file IO performance of SRFS on Ether on the Internet (ITBL network) between JAXA (Chofu) - NIED (Tsukuba). In this test, performance reached 220 - 270 (Mbps) (180 - 200 (Mbps) with a VPN connection) in SRFS on Ether, in contrast with the limit of 10 - 20(Mbps) encountered with the NFS. Thus it is possible to

use the HPC system from a remote location because SRFS on Ether has demonstrated sufficiently high performance in a practical environment like the ITBL network.

NTIS

Ethernet; Ethers; Evaluation; Internets

20070011727 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations

Anderson, Yanhua Z.; Morgan, H. D.; Scarffe, V.; Heventhal, W. M., III; Doody, D. F.; Seal, D. A.; Ray, T. L.; Cheng, L. Y.; Callahan, P. S.; Weld, K. R.; June 19, 2006; 7 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.:

Other Sources

ONLINE: <http://hdl.handle.net/2014/39846>

We describe the problem of regular small telemetry losses incurred during coherency mode transitions in Cassini's telecommunication. The project did not originally plan any corrective steps for avoiding these data losses, because of 1) the disparity between the small durations of the transitions (1-2 min) and large playback capability losses (15 min) needed for bracketing the transition time spans and 2) the unpredictable content of data downlinking during the transitions. However, as the intense science data return from the tour began, it became apparent that the impact of these small losses can sometimes be significant. We provide two examples of the impact on Radar-dedicated Titan flybys.

Author

Telemetry; Radar Tracking; Telecommunication; Cassini Mission

20070011750 National Telecommunications and Information Administration, Washington, DC USA

Proceedings of the International Symposium on Advanced Radio Technologies. Held in Boulder, Colorado on February 26-28, 2007

Raush, P. J.; Davis, K. E.; Feb. 2007; 168 pp.; In English; International Symposium on Advanced Radio Technologies., 26-28 Feb. 2007, Boulder, Colorado, USA

Report No.(s): PB2007-106470; NTIA-SP-07-445; No Copyright; Avail.: CASI: [A08](#), Hardcopy

Partial Contents: Apartment Building RF Penetration Measurements Using an Ultra-Wideband Measurement System; Indoor Navigation Test Results Using an Integrated GPS/TOA/Inertial Navigation System; Wideband Channel Characteristics for Indoor Reception of Satellite Transmissions at 2.4 GHz; Measurement and Modeling of in door MIMO-OFDM Channels; Simulation and Modeling of Propagation Paths Involving the Indoor/Outdoor Interface; Potential Cognitive Radio Denial-of-Service Vulnerabilities and Countermeasures; Combining Cognitive Radio and Software Radio Approach for Low Complexity Receiver Architecture; A Study on the Impact of UWB Sensor on the Mobile station of Next Generation mobile System in Korea; Standards Development for Wireless Communications for Urban Search and Rescue Robots; Spectrum Sharing and Potential Interference to Radars; Spectrum Management Support for Developing Countries: Critique and Recommendations; Propagation Model Development Considerations for Short-Range and Low-Antenna Height Applications. NTIS

Conferences; Radio Equipment

20070011751 Virginia Transportation Research Council, Charlottesville, VA USA

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology

Fontaine, M. D.; Yakkala, A. P.; Smith, B. L.; Jan. 2007; 58 pp.; In English

Report No.(s): PB2007-106644; VTRC-07-CR12; Copyright; Avail.: National Technical Information Service (NTIS)

Transportation agencies have become very interested in traffic monitoring systems based on wireless location technology (WLT) since they offer the potential of collecting travel time data across a wide portion of the road system. Prior tests of WLT-based systems have been unsuccessful, in part because they have treated the road network as a homogeneous entity. This 'area wide' method has inherent limitations, causing congested roadways to be over sampled and uncongested and low volume roads to be under sampled. This project developed a methodology to estimate sampling parameters based on localized traffic conditions in the network, termed a 'zonal approach'. In zonal WLT systems, the roadway network is disaggregated into smaller areas, termed 'zones', based on cellular coverage areas. In this research, two zonal sampling strategies were examined and tested using three simulated networks. When the road network is complex, the zonal priority sampling strategy was found to distribute probes throughout the network and produced a larger number of speed estimates on uncongested and low volume roads. Moreover, the zonal priority strategy improved speed estimation accuracy by 10 percent over the other two sampling

strategies. For networks with simple geometry or uniform congested traffic conditions, there were no significant differences among the sampling strategies. The results of this research indicate that the homogeneous approach used by earlier deployments has limitations, and results could be potentially improved by tailoring sampling parameters to a more localized level.

NTIS

Air Traffic Control; Position (Location); Sampling; Traffic; Transportation Networks

20070012790 Royal Military Coll. of Science, Shrivenham, UK

A System Shock Approach to Modelling Clandestine Network Disruption

Dipper, Tamlan; Oct 25, 2004; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A460301; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA460301>

No abstract available

Communication Networks; Disrupting; Military Operations; Terrorism

20070012879 International Computer Science Inst., Berkeley, CA USA

Entropy Based Classifier Combination for Sentence Segmentation

Magimai-Doss, M; Hakkani-Tur, D; Cetin, O; Shriberg, E; Fung, J; Mirghafori, N; Jan 2007; 5 pp.; In English

Contract(s)/Grant(s): HR0011-06-C-0023

Report No.(s): AD-A463040; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463040>

We describe recent extensions to our previous work, where we explored the use of individual classifiers, namely, boosting and maximum entropy models for sentence segmentation. In this paper we extend the set of classification methods with support vector machine (SVM). We propose a new dynamic entropy-based classifier combination approach to combine these classifiers, and compare it with the traditional classifier combination techniques, namely, voting, linear regression and logistic regression. Furthermore, we also investigate the combination of hidden event language models with the output of the proposed classifier combination, and the output of individual classifiers. Experimental studies conducted on the Mandarin TDT4 broadcast news database shows that the SVM classifier as an individual classifier improves over our previous best system. However, the proposed entropy-based classifier combination approach shows the best improvement in F-Measure of 1% absolute, and the voting approach shows the best reduction in NIST error rate of 2.7% absolute when compared to the previous best system.

DTIC

Classifiers; Entropy; Segments; Sentences; Speech Recognition

20070012890 General Accounting Office, Washington, DC USA

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection

Jan 2007; 55 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463059; GAO-07-113; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463059>

As we and others have observed for several years, notwithstanding the emergence of adversaries that can use chemical and biological weapons, the fielding of collective protection equipment at both critical overseas fixed facilities and major expeditionary warfighting assets remains limited and inconsistent. Assessing the need and priority for such equipment is difficult because of the significant uncertainties in the intelligence about the nature of the chemical and biological threat. While the intelligence community recognizes the need to assess and communicate these uncertainties about the chemical warfare threat, this information has not been available to the agencies that need it. Specifically, the intelligence community, under the leadership of the Director of National Intelligence, has not been able to complete an up-to-date National Intelligence Estimate on chemical warfare in part due to changing assessment and communication policies, as well as issues surrounding the basis or evidence for the assessments. In our view, an updated chemical warfare National Intelligence Estimate is needed to provide a critical input and basis for decisions on investments in chemical warfare defenses, including collective protection. Uncertainty about the threat can lead to resources being invested in assets where they may not be needed. Conversely, not providing collective protection where it may be needed can place military personnel and operations at increased risk. In addition, allowing the current fragmented and disjointed framework for managing installation protection policies to continue

without agreed-upon priorities for funding or clear requirements and service guidance on the appropriate use of collective protection, further increases the likelihood that limited DOD resources will be used inefficiently and ineffectively.

DTIC

Chemical Warfare; Intelligence; Military Personnel; Priorities; Protection; Protectors; Telecommunication; Warfare

20070012924 Army Research Lab., Aberdeen Proving Ground, MD USA

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology

Bowman, Elizabeth K; Kirin, Steven; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463118; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463118>

We investigated the contributions that unmanned sensor imagery provides to platoon leaders operating in a force-on-force experiment. We followed the platoon leader, platoon sergeant, and Robotics Non Commissioned Officer (NCO) as they conducted reconnaissance missions against a live, unscripted opposing force (OPFOR) in the Ft. Dix, New Jersey environment. Our situation awareness (SA) survey methodology was consistent with the Situation Awareness Global Assessment Technique (SAGAT) (Endsley, 2000). We randomly asked leaders to answer questions about the OPFOR and to draw their locations on a map. We later compared these answers and drawings with computer-generated maps that showed geo-referenced positions of the OPFOR. Our findings indicate that leader SA was higher, in general, when using unmanned sensor technology than when relying upon human intelligence alone. However, the ability of leaders to consistently demonstrate high levels of SA across trials was disappointing. We believe this is due, in part, to the uneven performance of the sensor imagery, the periodic failure of the communication system due to dense foliage of the site, and the inability of the leaders to develop effective tactics, techniques, and procedures (TTPs) for the persistent monitoring of the sensor images and coordination with unmanned sensor operators.

DTIC

Detectors; Leadership; Organizations; Personnel; Robotics; Situational Awareness

20070012949 General Dynamics Advanced Information Systems, Dayton, OH USA

Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts)

Funke, Gregory J; Galster, Scott M; Nelson, W T; Dukes, Allen W; Jun 21, 2006; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463206; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463206>

Recent trends in military acquisition have emphasized the desire to introduce collaboration technologies into the command and control environment. Personnel in this environment may be disparate in terms of rank, occupation, and even geographical location, yet are expected to rapidly coalesce into functioning teams in order to meet task requirements. It has been proposed that integration and performance may be facilitated through emerging collaborative technologies, such as email, instant messaging (IM), virtual whiteboards, and videoconferencing. Proponents of Network Enabled Capability (NEC) argue that these technologies might engender a degree of command decentralization that would result in increased situational awareness and task flexibility for battle managers. However, there are growing concerns about the potential negative impact on performance associated with the use of collaborative tools in distributed team environments.

DTIC

Charts; Command and Control; Human Performance; Teams

20070012963 Naval Postgraduate School, Monterey, CA USA

Comparative Analysis of C2 Structures for Global Ballistic Missile Defense

Michael, James B; Shing, Man-Tak; Perrett, Mitchell R; Um, Joon H; Jun 2006; 39 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463293; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463293>

Global ballistic missile defense (BMD) is a new type of warfare that is characterized by its fast tempo and little force movement. Time budgets for executing kill-chain tasks during an engagement are highly constrained, making it necessary to rely on high degrees of automation of all aspects of decision-making except in cases in which a tracked object requires the attention of a human operator. This paper examines three C2 structures for BMD: (1) a hierarchical structure based on current organization, (2) a compressed structure with one global commander and separate regional commanders, and (3) a flattened

chain of command in which all resources are allocated directly to a single commander. We develop simulation models for the three command structures using the OMNeT++ software, and compare their effect on the effectiveness of a BMD to engage threats based on the number of messages generated and processed among the nodes in the structure, and the threat processing time under three scenarios of increasing difficulty. Our results indicate that a compressed chain of command produces the fastest time, although the flattened chain of command produces the least amount of message passing.

DTIC

Antimissile Defense; Ballistic Missiles; Command and Control; Missile Defense; Structural Analysis

20070012973 Space and Naval Warfare Systems Center, San Diego, CA USA

Command World

Wong, Leah; Lange, Douglas S; Sebastyn, Jerome T; Roof, William H; Jun 2006; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463321; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463321>

Command World is an unclassified simulation used to create data for DARPA's Personalized Assistant that Learns (PAL) program. The Command World scenario was expressly designed as a crisis action planning exercise in order to replicate the communications, collaboration, and information requirements inherent in a military domain and to facilitate realistic and relevant communications and collaboration exchanges across an information system network. The development of a robust and unclassified scenario and all of the supporting training artifacts was integral to the program goals of process execution, transfer learning, and the eventual development of a bootstrap ontology for PAL use in a military environment. The PAL program is designed to explore the possibility of creating tools that will assist military planners in their tasks through the use of digital assistants. By instrumenting the environment over 5 experiments, over 200,000 events were captured. This paper will describe the environment, the data collected, and how the data is being used.

DTIC

Emergencies; Management Methods; Simulation

20070012978 MAK Technologies, Inc., Cambridge, MA USA

Transitioning Research Concepts to the Command and Control Community Quickly

Summers, Valerie A; Katz, Warren; Flo, Robert; Jun 2006; 25 pp.; In English

Report No.(s): AD-A463328; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463328>

We present a business model providing an extremely fast method of transferring new research to the command and control community. As any software developer or user knows, there is a vast gulf between research beta prototypes and commercial quality software. By shortening the time between concept and commercialization, command and control programs increase their technological advantage. We demonstrate that a marketplace of multiple competing vendors of similar products works much better than a single anointed government-subsidized solution. In particular, using Small Business Innovative Research (SBIR) grants to transition to commercial-off-the-shelf (COTS) software is more effective than monolithic decade-long programs. We briefly mention the products, as concrete examples of successful commercialization, but defer any detailed description of the products themselves to other literatures. The emphasis in this paper is on the process, not the specific grants or products.

DTIC

Command and Control; Commercialization; Procurement

20070012982 Naval War Coll., Newport, RI USA

Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace

Christie, Kevin A; Oct 23, 2006; 23 pp.; In English

Report No.(s): AD-A463368; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463368>

The nature of the Global War On Terror (GWOT) has driven U.S. Conventional Forces (CF) and Special Operations Forces (SOF) to unprecedented levels of cooperation on the battlefield, and the historical conventional mistrust of SOF is being overwritten today by successful combined SOF/CF operations. The joint force and the Services must continue to improve the ability of SOF to conduct C2 and integrate C2 with their own capabilities. Integrated SOF and CF command and control is a base requirement for maximizing SOF effects in the irregular and asymmetric environments characteristic of the

GWOT. This paper will analyze the C2 integration between SOF and CF in Operation Iraqi Freedom (OIF), the current main effort of SOF and the U.S. military, and make recommendations for force-wide changes in doctrine, organization, training, materiel, leadership, personnel, and facilities as appropriate. Command and control of all aspects of SOF is too broad of a subject to explore in this paper. This paper concentrates on the C2 issues that most pertain to units conducting integrated ground operations, primarily Army Special Forces (SF), Navy SEALs, and U.S. Army and Marine conventional forces.

DTIC

Command and Control; Military Operations; Military Personnel

20070012984 Naval Postgraduate School, Monterey, CA USA

The Impact of Synchronous Text-Based Chat on Military Command and Control

Eovito, Bryan A; Jun 2006; 38 pp.; In English

Report No.(s): AD-A463372; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463372>

This research assesses the impact of synchronous (real-time), text-based chat on military command and control (C2) processes. Chat use among the services, particularly among joint forces, has evolved in ad hoc fashion to fill gaps in currently fielded C2 systems. This growth-by-improvisation inhibits clear definition of the underlying requirements: precisely what C2 deficiencies are being addressed by text-based chat tools? Or, from a bottom-up perspective: what capabilities do text-based chat tools bring to the war fighter? In this study we employ a broad set of use-cases to further refine why operators use chat based on how they apply chat to their specific combat problems. These use cases include ongoing combat operations in ENDURING FREEDOM, counter-insurgency operations in IRAQI FREEDOM, and disaster relief operations with Joint Task Force - Katrina. The focus of this study is on establishing operators perceived requirements in light of the current capabilities delivered by the existing text-based chat tools. From these reverse-engineered requirements we propose future work to establish these communication capabilities in the next-generation C2 systems.

DTIC

Command and Control; Texts

20070012986 Mantech SMA, Pittsburgh, PA USA

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design

Potter, Scott S; Elm, William C; Gualtieri, James W; Jun 2006; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463375; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463375>

Conducting a Cognitive Analysis to adequately support a follow-on design effort for innovative decision support tools is a tall order and requires specific properties to exist in the CTA in order to be successful. This paper outlines requirements for analytical methodologies to satisfy this need. These requirements are based on several premises. The first premise is that a representation shapes cognition and collaboration, which guide behavior. This is known as the Representation Effect (Norman, 1993). The representation effect summarizes a widespread psychological result that the content and context of a problem representation (i.e. its reflection in the design of user interface) can radically alter a decision-maker's responses. Thus, how a command and control system is designed influences the cognitive work that needs to be accomplished, either improving or degrading sense making performance. The second premise is that the representation must reflect the essential characteristics of the work domain. That is, the relationship (or mapping) between the visual structure established by a particular representation and the underlying constraints and relationships within the work domain itself is fundamental to the decision-maker's effectiveness when using the visualization. Without an explicit specification of this mapping, it is impossible to determine if the visualizations are supporting user's needs as intended, or, making the supported task more difficult (Zhang, 1997). Woods (1991) has called this the Mapping Principle.

DTIC

Cognition; Command and Control; Decision Support Systems; Mental Performance; Support Systems; Systems Engineering; Tasks

20070012991 Defence Science and Technology Organisation, Edgecliff, Australia

The Implications of Complex Adaptive Systems Theory for C2

Grisogono, Anne-Marie; Jun 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463382; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463382>

The study of Complex Adaptive Systems (CAS) has developed within a wide range of subject domains over the last couple of decades, spanning the biological sciences, economics, organisational science, public policy, environmental sciences, computer science, cognitive and social sciences, and lately, defence sciences. We have been researching how application of a CAS perspective to the most pressing and complex problems that defence faces can provide more effective tools and techniques to enable higher levels of success in dealing with these challenging problems. This approach has proved very fruitful and has generated insights that could lead to implementable and testable strategy options in a wide range of defence areas from strategic policy, the capability development process, and defence enterprise management to the design and evolution of complex defence systems and the command and control of tactical to strategic levels of operations. In this paper we will focus on the implications of CAS theory for C2, drawing on the understanding we have developed of what it is possible to do in the face of complexity, how adaptive mechanisms arise spontaneously in complex systems, how we may recognise them and influence their operation to better align with our purposes, and how we may develop additional adaptive mechanisms to foster more effective outcomes. The CAS we will address includes not just the complex networked systems within our own forces, but also those of our allies and adversaries, and those existing in the overall environment in which we operate. All these systems influence both what we are expected to do and what we are able to do, therefore understanding how the adaptive mechanisms already operating in them shape their behaviour and how to harness those mechanisms to our purposes is potentially a very valuable and powerful strategy.

DTIC

Adaptation; Command and Control; Complex Systems

20070012992 Evidence Based Research, Inc., Vienna, VA USA

Battle of the Bulge: The Impact of Information Age Command and Control on Conflict

Hayes, Richard E; Sugarman, Kristi; Jun 2006; 39 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463383; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463383>

The Battle of the Bulge, Hitler's desperate gamble to split the Allied forces attacking Germany from the west during the winter of 1945, is a classic in military history. It is written from the perspective of the Allied operational level of command. The decisions made at the operational level (theater and army) on the Allied side illustrate both (a) very effective Industrial Age decision making and (b) situations where the adoption of network-centric and Edge decision making (or perhaps better stated, sense making) would have made major differences. Understanding the Germans' decision making is also important in order to understand what happened because it was largely a reflection of one individual's idiosyncrasies as multiplied by a rigid, centralized, and hierarchical approach to command and control. To conclude, if greater information sharing had occurred, the German offensive might have been understood. This would have also caused the Allies to make a number of different decisions, such as greater emphasis on gathering intelligence in certain areas, and allowed for information to be distributed in a different method.

DTIC

Command and Control; Military Operations

20070012999 Battle Command, Fort Gordon, GA USA

Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2

Dunn, III, Charles; Pressley, Corey S; Sheppard, Arthur; Jun 2006; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463397; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463397>

Battle Lab Simulation Collaboration Environment (BLSCE) is a U.S. Army Training and Doctrine Command (TRADOC) initiative that was developed to support concept development and experimentation of Future Combat Systems (FCS) in a closed, distributed, simulation-rich environment. The configuration, maintenance, administrative and security responsibilities have been assigned to the Battle Command Battle Laboratory Gordon (BCBL-G). This paper will specifically address the network services that are provided to facilitate the Command and Control (C2) aspect of every future force experiment. It will describe BCBL-G's primary function of providing a secure wide area network that supports a distributed, simulation-rich environment. Additionally, this paper will describe the administrative services provided over the BLSCE to include: voice over IP, video teleconferencing, and a web portal. Furthermore, a brief description of BCBL-G's NOSC responsibilities will be provided to include antivirus protection, intrusion detection, authentication, and accreditation, surrounding an enterprise-sized WAN. In conclusion, the paper will preview future evolutionary refinements anticipated for the BLSCE and its continued role as the environment for evaluating the Army future.

DTIC

Command and Control; Education; Simulation

20070013156 Program Executive Office Integrated Warfare Systems, Washington, DC USA

What Force and Metrics for What End - Characterizing the Future Leadership and Force

Bryant, Russell E; Jun 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463144; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The challenge of the uncertain future causes many aspects of the military, indeed including the government as a whole, to be re-examined to determine what type of leadership and forces are needed for that uncertain future. Many of the preparations and transformation efforts focus on the systems and equipment that will be used and employed; that is appropriate, up to a point. There is some discussion and analysis done on the teams, social interactions and coordination of the operators of those systems in many venues beyond the Command and Control Research Program (CCRP). This paper will explore several factors which are not regularly placed on the table with the hardware and systems: ethics, spectrum of education, empowerment and accountability, and, capability and coordination of actions; for what objective: the largest common good; what interaction points: forces, locations, and entities which generate limited common good; and, suggested metric: general four-level framework of relative values, melded to the above items.

DTIC

Command and Control; Leadership

20070013169 Army Research Lab., Aberdeen Proving Ground, MD USA

The Formal Representation of Administrative and Operational Relationships within Defense Organizational Constructs

Chamberlain, Sam; Boller, Mike; Jun 2006; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463216; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The objective for Global Force Management (GFM) is to establish a transparent and universal process to manage, assess and display the worldwide disposition of US forces. This includes US force availability, readiness and capability to assess the risks associated with proposed allocation, assignment and apportionment options. Fundamental to GFM and foundational to transformation is the GFM Data Initiative (GFM DI), which addresses organizing force structure data in a joint hierarchical way for integration across Service lines. A major task of this endeavor is the creation of Service, Joint, and Office of the Secretary of Defense (OSD) organization computer servers to provide the basic, default reference data to which other data may be related. This data must be formally documented using unambiguous semantics so that sophisticated computer programs can economically exploit it. The abstraction of tree graphs has been chosen to formally represent this information. The nodes of the tree represent organizations while the links represent the associations between organizations. Although natural language definitions exist for many associations, the terms are often heavily overloaded with numerous definitions so that their meaning becomes ambiguous. Two examples are the terms assigned and assignment of forces. This paper describes the representations chosen for the GFM organization servers, the basic semantics of those associations, and how they are applied to common situations.

DTIC

Command and Control; Maintainability

20070013170 Northwestern Polytechnical Univ., Xian, China

Modeling Intelligent C2 Using Technology of Multi-Agent

Liu, Qiang; Xue, Huifeng; Jun 2006; 8 pp.; In English

Report No.(s): AD-A463217; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Intelligent command and control system model is constituted of four parts: foundation technique layer, situation perception layer, intention expectation layer and decision command layer. The model has five basic characters: systematic complexity, timely information, simultaneous manipulative, distributing of function and processing of collaboration. The system are composed of evaluate situation, belief format, rule confirm, reasoning judge, desire produce, commitment reach, mission execute in the proceeding.

DTIC

Command and Control; Intelligence; Models; Simulation

20070013173 Universidad de Los Andes, Bogota, Colombia

In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience

Ortiz, Roman D; Urrutia, Nicolas; Jun 2006; 13 pp.; In English

Report No.(s): AD-A463221; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In recent years Colombia's security forces have manifested an increased interest in C2 technology, multiplying programs to upgrade existing platforms and acquire new ones. Despite budget constraints, however, it seems that system design and procurement efforts have lacked sufficient coordination. Evidence suggests that the pursuit of separate -- and often incompatible -- C2 platforms has hindered progress towards successful joint and interagency cooperation. Given the nature of Colombia's armed conflict and the existence of joint and interagency operations doctrine since the 1970s, the current state of affairs seems quite a paradox. This paper proposes that much of the current situation results from two primary sources: (1) the persistence of considerable differences among the security forces' strategic visions of their role in the Internal Armed Conflict and the nature of the illegal armed groups, and (2) the civilian leadership's unwillingness and/or inability to play an active role in the C2 process. The paper reviews the evolution of C2 concepts across the Colombian security organizations, both civilian and military, and analyzes their impact upon the design of system architecture over time. In addition, it offers insight into the social processes that have facilitated, but mostly stonewalled, joint and interagency cooperation over the years.

DTIC
Colombia; Command and Control; Coordination; Security

20070013190 Naval War Coll., Newport, RI USA

Organizational Change for Improved C2 in the Information Age

Beltz, Todd; Oct 23, 2006; 27 pp.; In English

Report No.(s): AD-A463251; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Information superiority is a capability present today and expected to continue in the future. This capability provides information at faster rates increasing situational awareness, enhancing information sharing, and increasing the speed of decision making. The advantages of this information rich environment are not optimized because the users of information reside in an industrial age organizational structure. The command and control function within the organization is addressed. This paper defines effective command and control elements and applies these terms to recent military operations. The solutions to similar C2 problems from the corporate world are analyzed. Finally, the paper evaluates the examples and concludes a smaller and flatter organization based on task oriented groups is the most effective structure for the information superiority environment. A potential organization structure is recommended along with further study in this area to best achieve unity of effort, interoperability, and agility from the operational level organization.

DTIC

Command and Control; Situational Awareness

20070013192 ASRC Communication Ltd., Kirtland AFB, NM USA

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B

Sorroche, Joe; Byers, Rob; Barrett, Neil; Jun 2006; 20 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463257; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Link 11/11B, otherwise known as TADIL A and TADIL B, has been used by U.S. Services and NATO nations for many years. However, the NATO Standard Agreement (STANAG) 5602 Standard Interface for Multiple Platform Link Evaluation (SIMPLE) does not fully describe the radio frequency network environment, which is required to model a more robust Link 11/11B operation. In addition, the IEEE 1278.1a standard does not provide a way to model the Link 11/11B RF network, only send the data as non-standard, user-defined Signal Protocol Data Unit (PDU). A SISO Link 11/11B Product Development Group (PDG) has been formed, and has started working on a DIS and HLA standard for Link 11/11B transport and network modeling. The Link 11/11B DIS and HLA standard will be developed using many of the Link 16 methods and procedures. This paper presents a Link 11/11B model approach, including implementation of various Link 11/11B TDL message types (e.g. Roll Call, Net Sync, Short Broadcast). In addition, the first draft of the DIS Signal and Transmitter PDUs, and HLA Link 11/11B BOM will be presented.

DTIC

Data Links; Data Systems; Digital Data; Digital Systems; Information; Simulation

20070013196 Bearing Point, Inc., McLean, VA USA

Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward

McGreevy, Paul; Jun 2006; 16 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463280; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Implementing the Net-Centric Operations (NCO) vision in support of enhanced command and control presents technical,

operational, and cultural challenges. The technical challenges are being addressed by both industry and the Department of Defense pushing the state of the art further ahead. However, in many cases the technology 'art' is too far ahead of the DoD policy and management 'practice'. In fact, technology vendors offering products to help in the management aspects of network-enabled systems and services often find their solutions are in search of clearly-defined problems. This misalignment exists because a DOD enterprise level NCO operating model has not been clearly articulated to demonstrate how consumers and providers of net-centric services will interact. More than a Concept of Operations (CONOPS), which tends to describe an optimal end state, an operating model should be a framework to allow emergent behavior to first grow and then sustain a net-centric environment. Consequently, an NCO operating model must address architectural, policy, governance, performance monitoring, and cultural issues and practices. However, as noted above the operating model is itself a transformational model. It cannot prescribe a to-be world to any degree of specificity. Instead, the operating model establishes the tenets of policy and governance that can help align emerging technology to fulfill the vision of NCO. Once defined and set in motion, the operating model presents a way forward to defining emerging NCO capability requirements; selecting and implementing the enabling technologies; and extending the NCO environment to further Defense component and agency domains.

DTIC

Communication Networks; Military Operations; Technology Assessment; Warfare

20070013198 Naval Postgraduate School, Monterey, CA USA

C2 Policy Panel: Under the Avalanche, Which Way Is Up?

Hayes-Roth, Rick; Jun 2006; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463282; No Copyright; Avail.: CASI: [A02](#), Hardcopy

What Avalanche? * Exponential rates of technological change; * Joint, coalition, multi-agency collaboratives; * Information glut; * Distributed, unconventional, evolving and proliferating threats; * Compressed cycle times. -- Policy for What Purpose? * Neutralizing threats; * Increasing bang for the buck; * Improving continuously; * Enhancing agility and adaptability.

DTIC

Avalanches; Command and Control; Policies

20070013200 Defence Research and Development Canada, Toronto, Ontario Canada

C2 Policy: What's it for?

Pigeau, Ross; Jan 2006; 17 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463291; No Copyright; Avail.: CASI: [A03](#), Hardcopy

C2 Policy: What's it for? Military C2 Policy exists to answer two fundamental questions: (1) How can military organisations encourage creative command while also controlling command creativity? (2) How can coordinated action be achieved among all of these creative wills?

DTIC

Command and Control; Policies

20070013201 Michigan State Univ., East Lansing, MI USA

Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms

Johnson, Michael D; Hollenbeck, John R; Ilgen, Daniel R; Jundt, Dustin; Derue, D S; Barnes, Christopher; Jun 2006; 52 pp.; In English

Report No.(s): AD-A463294; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Structural Contingency Theory holds that teams perform best when their structure is aligned with their environment (Hollenbeck et al., 2002). Yet when teams perform poorly due to structural misalignment, they may focus on making changes to their personnel or processes rather than to their structure. This experiment examined whether teams decided to make changes in their structure, personnel, or processes when their structure was misaligned with their environment, and the impact of those decisions on their performance. Two interventions were tested: (1) providing information to teams on the typology of possible changes, and (2) the feedback provided to the teams about their previous structural alignment. Results indicated that teams were most likely to choose to change their structure when (1) they were explicitly informed about the three possible types of changes, and (2) they were provided with feedback regarding their structural alignment. Teams that changed structure subsequently performed better than teams that did not change structure, and the decision to change structure mediated the relationship between the interventions and subsequent team performance. In contrast, a decision to change personnel did not

improve performance, and a decision to change process actually worsened team performance.

DTIC

Adaptation; Contingency

20070013221 Naval War Coll., Newport, RI USA

Centralized Command and Control of Theater Missile Defense: The Joint Force Missile Defense Component Coordinator

Bucey, William H; Feb 13, 2006; 23 pp.; In English

Report No.(s): AD-A463364; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Theater missile defense, a deduced deficiency from Desert Storm, garnered much attention in the decade preceding Iraqi Freedom. While theater missile defense during Iraqi Freedom resulted in complete success by effortlessly countering all ballistic missiles fired from Iraq, missile technology and proliferation has exacerbated the need to reevaluate joint doctrine. The future combat environment requires theater missile defense to be at the forefront of the joint task force, vice being delegated down the command and control structure. The numerous commands, decentralized command and control, and limited and expensive resources involved in TMD require changes to the joint doctrine in order to provide unity of command and economy of force. An examination of current doctrine and past performances in the missile defense arena reveal that a joint force missile defense component commander should be appointed in theaters requiring missile defense. This component commander should also have tactical control of joint forces possessing missile defense capabilities in order to truly give the joint force commander centralized command and control with decentralized execution of this critical mission.

DTIC

Command and Control; Missile Defense; Missiles

20070013223 Connecticut Univ., Storrs, CT USA

An Agent-Based Simulation Model for Organizational Analysis

Ruan, Sui; Gokhale, Swapna S; Pattipati, Krishna R; Jun 2006; 36 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-0101

Report No.(s): AD-A463376; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In many fields, including engineering, management, and organizational science, simulation-based computational organization theory has been used to gain insight into the degree of match ('congruence') between the organization (people, work processes and structure) and the tasks carried out by the organization. Simulation helps identify the bottlenecks, and improve the quality and efficiency of an organization. In this paper, we propose an approach based on the congruence model for analyzing and simulating the performance of an organization in project-based mission environments. In our model, organizations are constructed in terms of interacting components, namely, work and agents. The organizational structure depicts the grouping of agents, and the hierarchical arrangement of the groups. The congruence model of organizational behavior is based on the degree to which different components of the organization fit together. We use a discrete event simulator, specifically the Extend(trademark) simulation package, to quantify the performance of an organization based on this model. We illustrate our approach using a symbolic example of an air operations center organization.

DTIC

Organizations; Simulation

20070013234 North Carolina Agricultural and Technical State Univ., Greensboro, NC USA

Cognitive Constructs and the Sensemaking Process

Ntuen, Celestine A; Jun 2006; 57 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463415; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Battlefield realities seldom match the notional planning assumptions against the adversary during combats. This is because of the shifting and changing strategies of the adversary. This situation is even worse under the non-traditional adversary (NTA) conditions where planning takes place in the same mode as operations -- leading to plan-as-you-execute (PAYE) conditions. The PAYE paradigm, then, captures the reality of coping with the dynamics of the NTA battlefield conditions, such as, evolving, asymmetric, and overwhelming complex information. This paper presents the cognitive models that influence the enactment of a dynamic sense making process using the PAYE model.

DTIC

Cognition; Military Operations; Strategy

20070013247 Space and Naval Warfare Systems Center, San Diego, CA USA

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots

Custy, John; Shum, Allen; Mar 30, 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463445; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This document describes the mechanisms by which SHUMA provides adaptive, scalable access to Link-16 time slots while simplifying network design. Analysis and simulation results illustrate the relative merits of SHUMA versus conventional protocols.

DTIC

Data Links; Multiple Access; Protocol (Computers); Slots; Stochastic Processes

20070013252 Naval War Coll., Newport, RI USA

Reconfiguring Logistics Command and Control for the 21st Century

Dalke, Scott; May 17, 2005; 27 pp.; In English

Report No.(s): AD-A463453; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The joint nature of 21st Century warfighting mandates changes in the command and control structure overseeing logistics functions. While there is no debate as to the importance of logistics, there is considerable discussion and disagreement as to command and control issues. Without a truly joint logistic C2 structure, services will continue to rely on existing stove piped capabilities that too often result in ineffective workarounds and disjointed logistics efforts. One approach to resolving this problem is the establishment of a subunified logistics command that would ride the backbone of emerging technology in closing gaps that exist between inter-service logistics capabilities, including control of and use of prepositioned assets. This logical 'next step' in logistics command and control is essential in order to exploit past hard lessons learned and to improve the effectiveness of operational logistics.

DTIC

Command and Control; Logistics

20070013304 Naval War Coll., Newport, RI USA

Interagency Cooperation, Is It Enough to Achieve Unity of Effort?: Command and Control Concepts for the Homeland Maritime Domain

Knoop, Joseph A; Oct 10, 2006; 21 pp.; In English

Report No.(s): AD-A463561; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Protection of the Homeland Maritime Domain from terrorist attacks presents unique and complex difficulties for interagency coordination. Cooperation alone is not sufficient enough to allow U.S. Armed Forces and Domestic Agencies to function with the unity of effort that is required to operate within a decision cycle that is sufficiently fast enough to defeat a highly adaptive terrorist threat. Maritime Homeland Defense and Security needs to be married with operational command and control concepts that ensure unity of effort, that are in keeping with the principle of unity of command, and that allow a seamless transition between security and defense. This paper draws on lessons from the terrorist attacks of 9/11 to identify operational command and control principles that can be applied to the task of organizing the defense and security of the Maritime Domain. Finally, this paper proposes that the Joint Interagency Task Force, which was created to fight the War on Drugs, serves as an ideal C2 structure to model.

DTIC

Command and Control; Control Theory

20070013318 Massachusetts Univ., Amherst, MA USA

UMass at TREC 2006: Enterprise Track

Petkova, Desislava; Croft, W B; Jan 2006; 5 pp.; In English

Contract(s)/Grant(s): NBCHD030010

Report No.(s): AD-A463591; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper gives an overview of the work done at the University of Massachusetts, Amherst for the TREC 2006 Enterprise track. For the discussion search task, we compare two methods for incorporating thread evidence into the language models of email messages. For the expert finding task, we create implicit expert representations as mixtures of language models from associated documents.

DTIC

Electronic Mail; Message Processing

20070013337 Naval War Coll., Newport, RI USA

JCAS: Psst, the 'J' Stands for Joint

Seth, Curt A; May 17, 2005; 22 pp.; In English

Report No.(s): AD-A463684; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The mission of Close Air Support is almost as old as aircraft itself. Each respective service adopted its own respective procedures and C2 structure in accordance with their current doctrine. Since Goldwater-Nichols, the services have tried to align their doctrine and procedures and have succeeded to a point. With technology expanding the capabilities of our air and ground forces, our JCAS doctrine is still behind where we should be as a fighting force. JCAS symposiums have helped align procedures, but the attitudes and mindsets of some services go much deeper than a piece of paper. Now is the time to truly transition to a JCAS force and give our fighting units all the tools they need to succeed on the battlefield.

DTIC

Command and Control; Support Systems

20070013353 Naval War Coll., Newport, RI USA

The Proliferation Security Initiative: Cooperative Process or Command and Control Nightmare?

Stuckman, Dana E; May 16, 2006; 23 pp.; In English

Report No.(s): AD-A463718; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In response to a new, vigorous emphasis on WMD proliferation, Defense Secretary Rumsfeld named the Commander, U.S. Strategic Command (USSTRATCOM) as the lead DoD agency for integrating and synchronizing DoD efforts in combating WMD. This is an enormous challenge for STRATCOM to ensure all Combatant Commands (COCOMs) are working together effectively among themselves, interagency participants and our international partners. As more international participants are invited to join the Proliferation Security Initiative and WMD proliferators invent new methods to circumvent interdiction efforts to stop the transfer of WMD among rogue states, STRATCOM and supported COCOMs must have the doctrine, resources and proper command and control structures to deal with these challenges. Although enormous strides have been made in the area of interdiction, more emphasis must be placed on command and control and the types of expertise required in order for PSI interdiction efforts to be effective. The ability to bring military resources to bear to legally interdict a shipment of WMD will be successful only if the groundwork for doctrine, materiel and effective command and control relationships have been cultivated well in advance. This paper will provide a brief background on the PSI and provide examples of the doctrine which supports it from the national to the operational levels. Additionally, it will illustrate the types of resources required for interdiction operations and why command and control is critical for success during these operations. Finally, it will provide a recommendation for establishment of interdiction cells of expertise to allow for effective command and control of both national and international assets participating in the PSI.

DTIC

Command and Control; Destruction; Security

20070013355 Army Research Lab., Aberdeen Proving Ground, MD USA

Soldier Performance Issues in C2 'On the Move'

Hill, Susan G; Tauson, Richard A; Jun 2005; 31 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463726; No Copyright; Avail.: CASI: [A03](#), Hardcopy

For several years, the need for increased mobility for command and control (C2) assets in U.S. ground forces has been apparent. However, increased use of automated information systems in moving vehicles does incur a price in Soldier performance. There are many Soldier performance issues associated with the performance of tasks while the vehicle is moving, that is, on the move. This paper presents some of the issues related to the effects of vehicle motion on Soldier performance. The issues include vibration, visual displays, manual control, interactions among Soldiers, cognitive functions, and workload. Four areas of mitigation for vehicle motion effects are identified and briefly discussed.

DTIC

Command and Control; Mobility; Motion

20070013485 National Defence Research Establishment, Linköping, Sweden

Slutrapport foer Projekt KOMET (Final Report of the Project KOMET)

Waem, A.; Lundborg, B.; Loefsved, E.; Eriksson, G.; Pettersson, M.; Dec. 2005; 50 pp.; In Swedish

Report No.(s): PB2007-105507; FOI-R-1810-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

The radio channel sets limits for wireless communication systems. There is a substantial demand for systems with stealth

capability and robustness to jamming as well as to difficult wave propagation conditions. Military operations in urban environment are in general conducted with dismounted soldiers, both outside and inside buildings, including below ground in basements and culverts. The situation puts new demands on our understanding of the communication links and their limitations. For some situations, free space optics may be a better choice than radio communication. During 2003-2005, the project KOMET, 'The properties of the communication channel in urban environment,' has studied the radio wave propagation in urban environment. Calculations with commercial software have been performed as well as channel measurements, some in collaboration with Lund University. Two different techniques of free space optics were studied, non-line-of-sight and retro communication. Urban warfare has also been studied.

NTIS

Radio Communication; Wireless Communication; Telecommunication; Channels (Data Transmission)

20070013488 Swedish Defence Research Establishment, Linköping, Sweden

Gruppantenneteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report)

Erickson, R.; Malmqvist, R.; Pettersson, L.; Nelander, A.; Huss, L.; Dec. 2005; 38 pp.; In Swedish

Report No.(s): PB2007-105504; FOI-R-1816-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

To be able to meet future demands for flexible and persistent surveillance and reconnaissance there is a growing interest to enhance the number of sensor functions available on future surveillance vehicles and platforms. The advantages of single function RF-sensors and communication links are well known. But the possibilities of enhancing the number of RF-systems on a vehicle is restricted by its payload capacity, available power, suitable sensor positions, low-observable requirements and not least by what can be financially afforded. The project Array antenna technology and programmable microwave systems has investigated possibilities to develop reconfigurable sensor technology where the same hardware would be able to adapt its characteristics to suit the needs of several RF-functions. The aim is to be able to perform multiple RF-functions with the same aperture and front-end. The report summarizes work and results within: system requirement analysis; sensor development and modeling; signal processing; and national and international co-operation.

NTIS

Antenna Arrays; Microwave Equipment; Technology Utilization; Systems Engineering

20070013567 National Defense Univ., Washington, DC USA

Transforming the Structure of the Military: Combat Decisions -- Rank, Responsibility, or Frontline Position?

West, Bing; Jan 2007; 16 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463074; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463074>

This case study raises the questions of whether, in this day of advanced information networks, field grade military officers should be present at the scene of complex tactical battles, and whether net-centric operations allow commanders to operate effectively from the front lines. Many have assumed that new information technologies lift the fog of war and therefore allow commanders to operate with clear vision from rear positions. This study examines the opposite postulate -- that net-centric capabilities allow a commander to control operations and his own rear-based command staff from a forward-based position that enables him to watch the battle unfold firsthand. In this case a battalion commander (Lt. Colonel) was on-scene when a suicide bomber smashed into a convoy. After the action, the staff in the combat operations center were convinced his presence had made a critical difference in the outcome. Is that an anomaly, or is it time to take a critical look at the relationship between rank and responsibilities on the 21st-century battlefield? The case is intended to facilitate discussion about the role of net-centric operations in combat and the impact that they might have on rank structure and associated responsibilities. The services differ markedly in what they expect officers of the same rank to do and where they should place themselves in battle. For instance, battalion commanders are expected to remain a good distance behind their companies when engaged. Squadron commanders of the same rank, however, lead their aircraft formations, while Navy commanders fight on their ships, making the most up-to-the minute decisions during combat. This case study focuses on an example from the infantry, but the underlying problem of structural rigidity applies throughout the military. Although the IT revolution has flattened the command structures of corporations, the military has persisted with a pyramidal structure designed by Napoleon.

DTIC

Combat; Communication Networks

20070013569 National Defense Univ., Washington, DC USA

Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle

Kugler, Richard L; Jan 2007; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463075; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463075>

In his memoirs, 'American Soldier,' former U.S. Central Command (CENTCOM) Commander General Tommy Franks, USA, (Ret.) portrayed Operation Anaconda as an 'absolute and unqualified success,' but one in which the original U.S. military battle plan 'didn't survive first contact with the enemy.' General Franks' apt portrayal provides the framework for this case study of Operation Anaconda, which took place in the Shahikot Valley of eastern Afghanistan during early March 2002. The goal of Operation Anaconda was to root out enemy Taliban and al Qaeda forces that had gathered in the valley following their earlier defeats in the first 3 months of the war. To achieve this goal, U.S. commanders crafted a complex and sophisticated battle plan involving a 'hammer and anvil attack' by U.S. and friendly Afghan ground forces into the valley. This battle plan unraveled on the first day when enemy resistance proved fiercer than originally anticipated and friendly Afghan forces failed to carry out their march into the valley, thereby leaving deployed U.S. infantry forces to face the enemy alone. Success was achieved when U.S. forces switched tactical gears by calling on air strikes to work with the ground forces to suppress and destroy the enemy. Originally planned as a 3-day battle with light combat, Operation Anaconda turned out to be a 7-day battle with intense combat and was officially terminated only after 17 days. Operation Anaconda, which lasted from March 2-18, was successful because up to several hundred enemy fighters were killed and the rest fled the Shahikot Valley, leaving it in the control of U.S. and allied forces. U.S. casualties totaled eight military personnel killed and over 50 wounded. Success was achieved because the U.S. military showed a capacity to adapt by employing joint operations and modern information networks to surmount a surprising and difficult challenge. This paper recounts the battle's key features, its initial frustrations, and its ultimate success.

DTIC

Communication Networks; Military Operations; Planning; Support Systems

20070013573 Air Force Command and Control Training and Innovation Group, Hurlburt Field, FL USA

The USAF Installation Control Center (ICC)

Romrell, Calvin J; Zimmerman, Carl; Jun 2006; 32 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463130; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463130>

The USAF Installation Control Center (ICC) Enabling Concept establishes a standardized, functional organization for all installations; facilitating installation level C2 across the full spectrum of military operations. The ICC provides an Air Force installation commander, or senior Air Force member, a single, consolidated C2 center from which they can monitor and execute the installation's varied missions--including tenant; joint; and combined missions for which the commander bears collateral supporting responsibility. The ICC concept is a functional architecture that includes the processes, people, and equipment required to provide C2 support a fixed installation or deployed AEW/AEG. Installations may include fixed locations, such as a main operating base (MOB) both in the USA and overseas, or deployed which include forward operating locations (FOL), a collocated operating base (COB), a limited base (LB), or a bare base (BB). This concept has matured through experimentation (Expeditionary Force Experiment 98, Joint Expeditionary Force Experiment 99, 2000, 2002 and the Air Expeditionary Force Battlelab Integrated Flight Operations Initiative in 2002); implementation (combat and mobility operations at Al Udeid and Al Jabar); and subsequent validation efforts (Operational Readiness Inspections in USAFE and PACAF).

DTIC

Installing

20070013579 QinetiQ Ltd., Malvern, UK

Experiments into the Operation and Effectiveness of Edge Organizations

Dodd, Lorraine; Richardson, Sean; Alston, Anthony; Beautement, Patrick; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463413; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Over the past year a team from QinetiQ in the UK has been investigating Edge Organizations under the sponsorship of the CCRP. The aim of the work was to establish the command arrangements for Edge Organizations, showing how these arrangements will work in many types of operational environment and how they perform against traditional, hierarchical organizations with more centralized command styles and against extremely decentralized organizations. The working premise

was that the command arrangements of an Edge Organization can only be fully understood within the operational context. Hence, how an organization operates can only be understood in the full context of its environment. The study first considered and characterized the environment, then the Edge Organization within it and finally the necessary command arrangements that enable the Edge Organization to operate. The study concluded that an experimental campaign was required to test the thesis: '...the organizational agility of Edge Organizations allows their operating units to exert more decisive influence over a wider range of adversarial organizations within many types of operational contexts than those of less agile centralized or de-centralized organizations.'

DTIC

Experiment Design; Organizations; System Effectiveness

20070013584 Echelon 4, LLC, Mequon, WI USA

C2 in the Joint Task Force (JTF) Enterprise

Bayne, Jay; Diggs, Donald; Jun 2006; 55 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463448; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Command and control (C2) comprises those policies (rules) and mechanisms (services), implemented through human and synthetic means, required for the effective governance of an enterprise. An enterprise is an arbitrary unit of organization tasked with governance of a mission. We present an enterprise command and control (EC2) framework designed to provide DOD enterprises, exemplified by a Joint Task Force (JTF), with shared network-accessible C2 services. A JTF is DOD's designated unit of organization responsible for mission-specific joint operations. JTF EC2 includes a precise definition of enterprise, an associated enterprise command structure (ECS) and a specific set of control processing services (CPS). The proposed framework is consistent with the DOD's stated goal of migrating to network-centric (i.e., GIG-mediated) operations (NCO). In support of collaboration in jointly managed activities, agile JTF enterprises benefit from service oriented capabilities along their vertical command (accountability) axes and along their horizontal production (logistics) axes, allowing them to support a wider range of NCO functions while simultaneously participating in and influencing behavior of multiple communities of interest (COIs).

DTIC

Command and Control; Military Operations

20070013605 Naval War Coll., Newport, RI USA

An Operational Commander's Guide to the Media

McCartney, Michael; May 17, 2005; 26 pp.; In English

Report No.(s): AD-A463563; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This paper will briefly examine the last 150 years of war and the military-media relationship to see what impact that relationship has had on the nation's ability to wage war. The examination will expose some of the key successes, failures, and consistencies throughout history concluding with a close look at the most recent war, Operation Iraqi Freedom and the advent of the embedded reporter. The Operational Commander is wise to review media relations and the successes and pitfalls of past conflicts, and to examine closely the results of Operation Iraqi Freedom so as to completely understand the media before developing a plan for media relations in a future operation.

DTIC

News Media; Warfare; Military Operations

20070013607 Naval War Coll., Newport, RI USA

Military-Media Relations: Lessons for the Joint Force Commander

Pennington, Brett D; Feb 13, 2006; 25 pp.; In English

Report No.(s): AD-A463622; No Copyright; Avail.: CASI: [A03](#), Hardcopy

With the increasing role of the media in society, the military-media relationship is one Joint Force Commanders must understand. To accomplish this, commanders must focus in three areas. First, they must develop an appreciation for the key principles of the two institutions. For the military these principles include operational security, operational capability, and beneficial media coverage. For the media, they are access, market share, and quality of reporting. Second, they should comprehend the history of the military-media relationship and the inadequacies of the media plans used in Vietnam, Grenada/Panama, and Desert Storm. Third, they need to recognize the successes gained through the embedded media program used in Operation Iraqi Freedom. Using this knowledge of the military-media relationship as a foundation, Joint Force Commanders can extract a number of lessons applicable to future operations. These include: learning from the past and

focusing on the future, seeking and providing guidance, taking an active role in media operations, being aware of media reports, and knowing the risks associated with embedded media operations. By emphasizing these lessons, commanders can break the paradigm of distrust and skepticism between the military and media, and operate in a mutually beneficial manner.

DTIC

Military Operations; News Media; Public Relations

20070013655 North Carolina Agricultural and Technical State Univ., Greensboro, NC USA

The Knowledge Structure of the Commander in Asymmetric Battlefield: The Six Sights and Sensemaking Process

Ntuen, Celestine A; Jun 2006; 39 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463414; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The battlefield commander or the CEO of a company is an intuitive statistician and a cognitive information processor. The commander must first make sense of the complex information provided from different sources. While there is availability of information technology to help the commander in data processing and analysis, it is not surprising that in real time operations, the commander falls back on what has been metaphorically called six senses (sights) while trying to make sense of a battle situation as well as making decisions to enact dynamic actions. In this paper, I present the six human sights -- insight, hindsight, foresight, short sight, and oversight, and show how each of the commander's sights moderate the sense-making process. It is surmised that these sights represent the dynamic knowledge structures of the commander while developing plans for an on-going operation. It is believed that each of the sights are evoked by intuition -- a 'vague feeling of knowing something without knowing exactly how or why.'

DTIC

Asymmetry; Command and Control; Information Management

20070013665 Naval War Coll., Newport, RI USA

Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs

Ekblad, William J; Feb 13, 2006; 22 pp.; In English

Report No.(s): AD-A463287; No Copyright; Avail.: CASI: [A03](#), Hardcopy

There is precious little in the way of formal guidance to the geographic combatant commanders (CCDRs) to manage and ensure synchronization of theater Strategic Communication (SC) initiatives with larger Department of Defense (DoD) and U.S. Government efforts. This paper explores the broad requirements to the CCDRs to link theater and national-level SC efforts. It further establishes the dearth of guidance to them on specific themes to emphasize, and how to coordinate themes and messages for emerging issues. Despite these gaps in guidance, CCDRs have continued to practice effective SC within their areas of responsibility fully in concert with larger DoD and USG initiatives. The efforts of some key CCDR staffs to craft organic processes and structures to bridge existing gaps in guidance are further explored. Finally, this effort concludes with an examination of forthcoming DoD and Joint Chiefs of Staff (JCS) initiatives to formally and permanently overcome current gaps in guidance.

DTIC

Military Operations; Telecommunication; Strategy; Defense Program

20070013668 State Univ. of New York, Albany, NY USA

Control Reconfiguration of Command and Control Systems

Wu, N E; Jan 2007; 63 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2304

Report No.(s): AD-A462717; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Currently, an air operation center (AOC) for a major regional conflict is composed of more than 400 personnel, hundreds of computer servers and an extensive communication infrastructure. So, in addition to the goals of achieving a faster, more real time response, there is also a desire to reduce the manning and equipment associated with the endeavor. This means that the management of redundancy must be optimized. An important consideration in the design and fielding of such systems is its capacity to accommodate faults through control reconfiguration using either direct or analytic redundancy. The latter relies on exploiting the inherent dynamic and static relationship of the system variables, and having the advantage of most efficient use of the components. This research applied the concepts of control reconfigurability to C2 systems modeled as stochastic discrete event systems.

DTIC

Command and Control; Systems Engineering; Control Theory; Mathematical Models

20070013673 Naval War Coll., Newport, RI USA

Keeping an Operational Perspective in a Network-Centric World

France, Derek C; Mar 6, 2006; 25 pp.; In English

Report No.(s): AD-A463275; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The dramatic increase in high fidelity, real-time data available to an operational commander through Network Centric Operations (NCO) has generated several instances of micro-management in recent conflicts. Operational commanders, when influenced by their own desire to control the situation, the limited nature of recent conflicts, and doctrine that encourages a focus on the highest fidelity, most real-time data, are likely to micro-manage the tactical level of war, losing the broader perspective and future orientation necessary for operational success. The antidote for micro-management is not to limit the use of technology; rather, it is operational leadership that understands the limits of technology and how to apply NCO theory to doctrine in a way that strengthens the operational level of war instead of shifting it to a tactical focus. This paper explores the causal factors of micro-management technology, nature of recent conflicts, leadership and doctrine. It highlights the short and long-term consequences of micro-management as well as practical ways an operational commander can recognize unwarranted tactical focus. Finally, it offers potential remedies including adjusting leadership style and doctrine that leverages the decentralizing aspects of NCO without accepting concepts that have high potential for micromanagement.

DTIC

Communication Networks; Warfare; Project Management; Military Operations

20070013674 Naval War Coll., Newport, RI USA

Operationalizing Defense Support to Public Diplomacy

Gannon, James M; Oct 23, 2006; 34 pp.; In English

Report No.(s): AD-A463278; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In the global 'war of ideas' currently being fought, defense support to public diplomacy, (DSPD), an enabling element of strategic communications, is a means that can contribute to the notion of countering ideological support to terrorism (CIST) by reinforcing U.S. strategic communication objectives in support of the U.S. National Security Strategy and regional engagement initiatives. This is difficult at best to implement at the strategic level, especially in the media environment and internet age. At the operational level, there is a lack of doctrine, policy, existence of 'best practices' or indeed agreement on how defense support to public diplomacy should be done. This paper examines recent operational cases where military operations supported public diplomacy objectives to achieve U.S. desired outcomes. It will analyze key success factors for consideration by operational level commanders, and offer recommendations on supporting public diplomacy as an important enabling military capability.

DTIC

Security; Defense Program; Military Operations

33

ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

20070011497 Haness Dickey and Pierce, PLC, Bloomfield Hills, MI, USA

Waveguide Apparatus and Method

Chen, M.; Takeuchi, J. S.; 14 Jan 04; 16 pp.; In English

Contract(s)/Grant(s): NRO-000-02-C-0032

Patent Info.: Filed Filed 14 Jan 04; US-Patent-Appl-SN-10-757 179

Report No.(s): PB2007-103285; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A waveguide transition for use with an antenna aperture. The waveguide includes a tubular waveguide component with a concentrically disposed dielectric insert. In one embodiment the inner surface of the waveguide component is non-linear and formed by either a gradually curving surface or a plurality of linear sections disposed adjacent one another to form an overall non-linear surface when viewed in profile. In other embodiments the outer surface of the dielectric insert is shaped so as to form either a gradually curving surface or by a plurality of non-linear, adjacently formed sections that form an overall non-linear shape when the dielectric insert is viewed in profile. The waveguide of the present invention produces significantly

improved cut-off frequency performance that allows a greater degree of flexibility in designing the antenna aperture with a desired operating frequency bandwidth.

NTIS

Waveguides; Methodology; Equipment

20070011503 Honeywell International, Inc., Morristown, NJ, USA

Separate Write and Read Access Architecture for a Magnetic Tunnel Junction

Katti, R. R.; 10 Jan 04; 12 pp.; In English

Contract(s)/Grant(s): DTRA01-00-C-0002

Patent Info.: Filed Filed 10 Jan 04; US-Patent-Appl-SN-10-754 880

Report No.(s): PB2007-103291; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A magnetoresistive device is provided with separate read and write architecture. In one embodiment, a magnetic tunnel junction (MTJ) has a nonmagnetic nonconductive barrier layer sandwiched between two ferromagnetic conducting layers. A first read line is coupled to a first ferromagnetic layer and a second read line is coupled to a second ferromagnetic layer such that a voltage difference between the two read lines will produce a current flowing perpendicularly through each layer of the MTJ. A first write line is separated from the first read line by a first insulator and a second write line is separated from the second read line by a second insulator.

NTIS

Tunnel Junctions; Magnetoresistivity; Architecture (Computers)

20070011504 Honeywell International, Inc., Morristown, NJ, USA

Bias-Adjusted Magnetoresistive Devices for Magnetic Random Access Memory (MRAM) Applications

Katti, R. R.; 10 Jan 04; 22 pp.; In English

Contract(s)/Grant(s): DTRA01-00-C-0002

Patent Info.: Filed Filed 10 Jan 04; US-Patent-Appl-SN-10-754 935

Report No.(s): PB2007-103290; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method and apparatus are presented for shifting a hysteresis loop of a magnetoresistive device. For example, a method provides for applying a bias current to a word line of the magnetoresistive device during either a read sequence or a write sequence. The bias current is preferably configured to substantially center a hysteresis loop of the device without switching a binary state of the device.

NTIS

Bias; Magnetic Storage; Magnetoresistivity; Random Access Memory

20070011505 Honeywell International, Inc., Morristown, NJ, USA

Tunneling Anisotropic Magnetoresistive Device and Method of Operation

Katti, R. R.; 10 Jan 04; 15 pp.; In English

Contract(s)/Grant(s): DTRA01-00-C-0002

Patent Info.: Filed Filed 10 Jan 04; US-Patent-Appl-SN-10-754 882

Report No.(s): PB2007-103292; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention provides for a tunneling anisotropic magnetoresistive (TAM) device and a method of operation. An embodiment of the device provides for a magnetic conducting sense layer with a fixed edge spin and a center magnetization direction, a magnetic conducting storage layer with a fixed edge spin and a center magnetization direction, and a nonmagnetic nonconducting barrier layer sandwiched between the sense layer and the storage layer. In one embodiment, the two center magnetization directions are aligned with a hard axis of the device, and the center magnetization direction of the storage layer is indicative of a logical state of the device. A larger magnetic field is required to invert the center magnetization direction of the storage layer than is required to invert the center magnetization direction of the sense layer.

NTIS

Anisotropy; Magnetoresistivity; Mechanical Devices

20070011508 Okeefe Egan and Peterman, LLP, Austin, TX, USA

Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers

Reichard, T. D.; 29 Jun 04; 14 pp.; In English

Contract(s)/Grant(s): F33657-00-G-4029

Patent Info.: Filed Filed 29 Jun 04; US-Patent-Appl-SN-10-880 441

Report No.(s): PB2007-103294; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An adaptive channel equalization technique and method for wideband passive receivers is disclosed that reduces and tends to minimize distortions caused by circuitry within passive digital receivers. This equalization architecture provides an adaptive equalization solution for a wideband passive channel that receives unknown signals from the RF environment both temporally and spectrally. A wideband chirp signal or calibration signal is periodically injected to capture the spectral response of the receiver channel as it varies from the distortions induced over time and temperature for synthesis of equalization filter coefficients. Thus, the channel equalization is performed independent of receiver signal source and is employed to minimize digital receiver signal measurement distortions across the passband by providing an equalization filter whose magnitude and phase response compensates for the channel distortions of the passive data collection system.

NTIS

Adaptation; Broadband; Digital Systems; Receivers

20070011523 Wilmer Cutler Pickering Hale and Dorr, LLP, Boston, MA, USA

Method for Making Sol Gel Spacers for Flat Panel Displays

Hoffman, J. J.; Vaartstra, B. A.; Kraus, B. D.; Westmoreland, D. L.; 1 Nov 04; 31 pp.; In English

Contract(s)/Grant(s): DABT63-97-C-0001

Patent Info.: Filed Filed 1 Nov 04; US-Patent-Appl-SN-10-978 323

Report No.(s): PB2007-101645; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention describes thick film photolithographic molds, methods of making thick film photolithographic molds, and methods of using thick film photolithographic molds to form spacers on a substrate. The thick film photolithographic molds preferably comprise an epoxy bisphenol A novolac resin. The present invention also describes sol gel spacers comprising sodium silicates and potassium silicates. The thick film photolithographic molds and sol gel spacers of the present invention can be used in flat panel displays, such as field emission displays and plasma displays.

NTIS

Flat Panel Displays; Sol-Gel Processes; Spacers; Thick Films

20070011527 Reinhart Boerner Van Deuren, SC, USA

Hole Transport Layer Compositions and Related Diode Devices

Marks, T. J.; Yan, H.; Huang, Q.; 10 Dec 04; 20 pp.; In English

Contract(s)/Grant(s): DMR-0076097

Patent Info.: Filed Filed 10 Dec 04; US-Patent-Appl-SN-11-009 883

Report No.(s): PB2007-103236; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Hole transport layer compositions comprising a silylated aryl amine and a polymeric component, to enhance performance of an associated electroluminescent device.

NTIS

Diodes; Mechanical Devices; Transport Theory; Holes (Mechanics)

20070011533 Weingarten Schurgin Gagnebin and Lebovici, LLP, Boston, MA, USA

Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation

Horenstein, M. N.; 10 Mar 03; 10 pp.; In English

Contract(s)/Grant(s): W-7405-ENG-48

Patent Info.: Filed Filed 10 Mar 03; US-Patent-Appl-SN-10-506 654

Report No.(s): PB2007-103315; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A micromechanical device comprising one or more electronically movable structure sets comprising for each set a first electrode supported on a substrate and a second electrode supported substantially parallel from said first electrode. Said second electrode is movable with respect to said first electrode whereby an electric potential applied between said first and second electrodes causing said second electrode to move relative to said first electrode a distance X , (X), where X is a nonlinear function of said potential, (V). Means are provided for linearizing the relationship between V and X .

NTIS

Deflection; Electric Potential; Electrodes; Microelectromechanical Systems; Micromechanics; Patent Applications; Voltage Regulators

20070011535 Foley and Lardner, LLP, Madison, WI, USA

Solid State High Power Device and Method

Ma, Z.; Jiang, N.; 19 Nov 04; 23 pp.; In English

Contract(s)/Grant(s): 0323717

Patent Info.: Filed Filed 19 Nov 04; US-Patent-Appl-SN-10-993 224

Report No.(s): PB2007-103282; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A high-power solid-state transistor structure comprised of a plurality of emitter or gate fingers in a uniform or non-uniform manner to provide improved high power performance is disclosed. Preferably, each of the fingers is associated with a corresponding one of a plurality of sub-cells, the sub-cells being arranged in at least one row. The advantage of the invention is that the structure can be practically implemented and the absolute thermal stability can be maintained for very high power transistors with reduced adverse effects resulting from random variation in the manufacturing and design process.

NTIS

Solid State; Solid State Devices; Methodology; Electronic Equipment

20070011538 Wolf, Greeffield and Sacks, PBC, Boston, MA, USA, Massachusetts Inst. of Tech., Cambridge, MA, USA

Emissive Sensors and Devices Incorporating These Sensors

Swager, T. M.; Kim, T. H.; Zhang, S. W.; 12 Apr 04; 37 pp.; In English

Contract(s)/Grant(s): DE-FG07-011D14222; DAAD19-99-1-0280

Patent Info.: Filed Filed 12 Apr 04; US-Patent-Appl-SN-10-823 093

Report No.(s): PB2007-103231; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention generally relates to luminescent and/or optically absorbing compositions and/or precursors to those compositions, including solid films incorporating these compositions/precursors, exhibiting increased luminescent lifetimes, quantum yields, enhanced stabilities and/or amplified emissions. The present invention also relates to sensors and methods for sensing analytes through luminescent and/or optically absorbing properties of these compositions and/or precursors. Examples of analytes detectable by the invention include, but are not limited to, electrophiles, alkylating agents, thionyl halides, and phosphate ester groups including phosphoryl halides, cyanides and thioates such as those found in certain chemical warfare agents. The present invention additionally relates to devices and methods for amplifying emissions, such as those produced using the above-described compositions and/or precursors, by incorporating the composition and/or precursor within a polymer having an energy migration pathway.

NTIS

Sensors; Mechanical Devices; Emissivity

20070011553 Ostrager Chong Flaherty and Broiman, LLP, New York, NY, USA

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array

Wodnicki, R. G.; 12 Nov 04; 11 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0181

Patent Info.: Filed Filed 12 Nov 04; US-Patent-Appl-SN-10-988 024

Report No.(s): PB2007-103313; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An integrated high-voltage switching circuit includes a switch having ON and OFF states and having a parasitic gate capacitance. The switch consists of a pair of DMOS transistors integrated back to back and having a shared gate terminal, the drains of the DMOS transistors being connected to the input and output terminals of the switch respectively. The switching circuit further includes a turn-on circuit comprising a PMOS transistor having its drain connected to the shared gate terminal of the switch via a first diode, having its source connected to a global switch gate bias voltage terminal from which the PMOS transistor draws current, and having its gate electrically coupled to a switch gate control terminal that receives a switch gate control voltage input. The switch transitions from the OFF state to the ON state in response to a first transition of the switch gate control voltage input that causes the PMOS transistor to turn on, and the switch remains in the ON state in response to a second transition of the switch gate control voltage input that causes the PMOS transistor to turn off. The DMOS transistors turn on in response to the shared gate being coupled to the switch gate bias voltage when the PMOS transistor turns on.

NTIS

High Voltages; Integrated Circuits; Switching Circuits; Transducers; Transistors; Ultrasonics

20070011561 McLeod and Moyne, P.C., Okekmos, MI, USA

Boron-Doped Nanocrystalline Diamond

Swain, G. M.; Show, Y.; Sonthalia, P.; Witek, M.; 17 Nov 04; 19 pp.; In English

Contract(s)/Grant(s): DA-2001-35102-100 45; NSF-CHE-0049090

Patent Info.: Filed Filed 17 Nov 04; US-Patent-Appl-SN-10-991 272

Report No.(s): PB2007-101606; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A conductive boron doped nanocrystalline diamond is described. The boron doped diamond has a conductivity which uses the boron in the crystals as a charge carrier. The diamond is particularly useful for electrochemical electrodes in oxidation-reduction reactions and decontamination of aqueous solutions.

NTIS

Boron; Diamonds; Doped Crystals; Nanocrystals

20070011562 Foster (Lynn G.), L.C., Salt Lake City, UT, USA

Microscopic Batteries for MEMS Systems

LaFollette, R. M.; Salmon, L. G.; Harb, J. N.; 8 Nov 04; 25 pp.; In English

Contract(s)/Grant(s): F20601-96-C-0078

Patent Info.: Filed Filed 8 Nov 04; US-Patent-Appl-SN-10-982 306

Report No.(s): PB2007-101607; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Microscopic batteries, integratable or integrated with and integrated circuit, including a MEMS microcircuit, and methods of microfabrication of such microscopic batteries are disclosed.

NTIS

Electric Batteries; Microelectromechanical Systems

20070011564 Saliwanchik Lloyd and Saliwanchik, Gainesville, FL, USA

Phantom for Production of Controllable FMRI Signal

Zhao, Q.; Duensing, G. R.; Chen, H.; Edelstein, W. A.; 4 Oct 04; 33 pp.; In English

Contract(s)/Grant(s): NIH-RO1EB00974

Patent Info.: Filed Filed 4 Oct 04; US-Patent-Appl-SN-10-957 822

Report No.(s): PB2007-101608; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The subject invention relates to a method and apparatus for producing stimulated MRI data. In an embodiment, a remote-controlled 'smart phantom' can produce simulated data. The simulated data can be acquired from a MRI system. The subject device can generate control signals and send the generated control signals to secondary coils/probes placed in the subject smart phantom. The control signals determine the current flow in the secondary coils/probes, which act as local spin magnetization amplifiers and thus produce regions of variable contrast to noise ratio. The control signals can be generated with various parameters, such as BOLD models, different levels of contrast-to-noise ratio (CNR), signal intensities, and physiological signals. Comparisons can be made with the widely-used simulated data by computers. Validation of the subject smart phantom can be performed with both theoretical analysis and data of human subjects.

NTIS

Signals; Magnetic Resonance; Imaging Techniques; Simulation

20070011566 Los Alamos National Lab., NM USA

Identification Coding Schemes for Modulated Reflectance Systems

Coates, D. M.; Briles, S. D.; Neagley, D. L.; Platts, D.; Clark, D. D.; 25 Nov 03; 13 pp.; In English

Contract(s)/Grant(s): DE-W-7405-ENG-36

Patent Info.: Filed Filed 25 Nov 03; US-Patent-Appl-SN-10-723 073

Report No.(s): PB2007-101609; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An identifying coding apparatus employing modulated reflectance technology involving a base station emitting a RF signal, with a tag, located remotely from the base station, and containing at least one antenna and predetermined other passive circuit components, receiving the RF signal and reflecting back to the base station a modulated signal indicative of characteristics related to the tag.

NTIS

Coding; Reflectance; Modulation

20070011568 Coburn (Thompson) LLP, Saint Louis, MO, USA

Virtual Pan/Tilt Camera System and Method for Vehicles

Tillotson, B. J.; 24 Nov 03; 11 pp.; In English

Patent Info.: Filed Filed 24 Nov 03; US-Patent-Appl-SN-10-722 148

Report No.(s): PB2007-101610; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention is directed to a virtual pan/tilt camera system and method for use with vehicles, and particularly ground vehicles (MGVs). The invention utilizes autonomous navigation systems (ANSs) used with pan/tilt cameras, but eliminates the pan/tilt cameras substituting a plurality of video cameras. Each video camera is mounted in a fixed orientation on the vehicle and covers a selected angular range of lateral view. Commands from the ANS are mapped to selected addresses where the video data from the video cameras are stored, and appropriately transformed data from the selected addresses are input to the ANS. Computers and software in the MGV receive video data from the cameras and stitch the imagery together into a single panoramic view. Video data from cameras with overlapping fields of view are used to simulate the view of stereo cameras.

NTIS

Attitude (Inclination); Cameras; Autonomous Navigation; Surface Vehicles

20070011569 Beyer Weaver and Thomas, LLP, Oakland, CA, USA

Double Hidden Flexure Microactuator for Phase Mirror Array

Oldham, W. G.; Chen, Y.; Shroff, Y.; 28 Sep 04; 8 pp.; In English

Contract(s)/Grant(s): MDA972-01-1-0021

Patent Info.: Filed Filed 28 Sep 04; US-Patent-Appl-SN-10-952 709

Report No.(s): PB2007-101612; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Disclosed is an actuator for a phase mirror array including (a) a first support member extending perpendicularly from a surface of a mirror, (b) a plurality of flexures engaging the first support member with the flexures being generally parallel to the surface of the mirror, (c) second and third support members engaging opposing ends of the flexures, at least one of the second and third support members functioning as a first electrode, and (d) a second electrode positioned in spaced parallel relationship with the flexures, whereby a voltage impressed across the first electrode and the second electrode causes displacement of the supported mirror on the support structure. The second electrode and one of the flexures can have undulating surfaces which mate in a comb relationship.

NTIS

Actuators; Flexing; Microinstrumentation; Mirrors

20070011570 Pennington (Joan), Chicago, IL, USA

Pattern Transfer with Self-Similar Sacrificial Mask Layer and Vector Magnetic Field Sensor

Hoffmann, A.; 3 Nov 04; 20 pp.; In English

Contract(s)/Grant(s): ANL-W-31-109-ENG-38

Patent Info.: Filed Filed 3 Nov 04; US-Patent-Appl-SN-10-980 507

Report No.(s): PB2007-101613; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method is provided for producing a lithographic pattern using a mask that includes the same materials as the material to be etched, allowing the pattern to be transferred and the etch mask to be removed in one step. In accordance with features of the invention, the method includes building up of a layer or layers of material of specific thickness on top of a substrate so that temporal control of an etching process allows formation of the desired pattern. Different exchange bias directions can be established by the use of shape anisotropy for the exchange biased component of a spin valve device. This enables several different magnetic reference directions to be present on a single chip, which allows a more compact magnetic field sensor to be developed. In accordance with features of the invention, different field directions are established on one single chip by using shape anisotropy.

NTIS

Magnetic Fields; Masks; Sensors

20070011572 Pietragallo, Botic and Gordon, Pittsburgh, PA, USA, Seagate Technology, LLC, Scotts Valley, CA, USA

Apparatus and Method for Coupling Light to a Thin Film Optical Waveguide

Peng, C.; 20 Nov 03; 15 pp.; In English

Contract(s)/Grant(s): NIST-70NANB1H3056

Patent Info.: Filed Filed 20 Nov 03; US-Patent-Appl-SN-10-718 162

Report No.(s): PB2007-101615; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An optical waveguide comprises a core guiding layer; a cladding layer positioned adjacent to the core guiding layer; a reflective layer positioned adjacent to the cladding layer; and a grating for coupling light into the core guiding layer; wherein the cladding layer has a thickness such that a ray reflected from the reflective layer is phase matched to an incident ray at the grating. A method of coupling electromagnetic radiation into the optical waveguide is also described.

NTIS

Optical Waveguides; Thin Films

20070011576 Lawrence Livermore National Lab., Livermore, CA USA

Analysis of Thin Wires Using Higher-Order Elements and Basis Functions

Champagne, N. J.; Wilton, D. R.; Rockway, J. W.; Feb. 14, 2006; 6 pp.; In English

Report No.(s): DE2006-894004; UCRL-CONF-218970; No Copyright; Avail.: Department of Energy Information Bridge

Thin wire analysis was applied to curved wire segments in (1), but a special procedure was needed to evaluate the self and near-self terms. The procedure involved associating the singular behavior with a straight segment tangent to the curved source segment, permitting use of algorithms for straight wires. Recently, a procedure that avoids the singularity extraction for straight wires was presented in (2-4). In this paper, the approach in (4) is applied to curved (or higher-order) wires using a procedure similar to that used in (1) for singularity extraction. Here, the straight tangent segment is used to determine the quadrature rules to be used on the curved segment. The result is a formulation that allows for a general mixture of higher-order basis functions (5) and higher-order wire segments.

NTIS

Algorithms; Wire; Singularity (Mathematics)

20070011598 NanoSystems, Inc., Palo Alto, CA, USA

Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices

Scher, E.; Buretea, M. A.; Chow, C.; Emedocias, S.; Meisel, A.; 9 Dec 04; 39 pp.; In English

Contract(s)/Grant(s): NRO-03-C-0042

Patent Info.: Filed Filed 9 Dec 04; US-Patent-Appl-SN-11-007 916

Report No.(s): PB2007-103277; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Nanocomposite photovoltaic devices are provided that generally include semiconductor nanocrystals as at least a portion of a photoactive layer. Photovoltaic devices and other layered devices that comprise core-shell nanostructures and/or two populations of nanostructures, where the nanostructures are not necessarily part of a nanocomposite, are also features of the invention. Varied architectures for such devices are also provided including flexible and rigid architectures, planar and non-planar architectures and the like, as are systems incorporating such devices, and methods and systems for fabricating such devices. Compositions comprising two populations of nanostructures of different materials are also a feature of the invention.

NTIS

Nanocomposites; Nanostructure (Characteristics); Nanostructures (Devices); Semiconductor Devices

20070011755 Christian [Stephen R.], Idaho Falls, ID, USA

Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor

Roach, J. A.; Richardson, J. G.; Raivo, B. D.; Soelberg, N. R.; 7 Nov 03; 18 pp.; In English

Contract(s)/Grant(s): DE-AC07-99ID13727

Patent Info.: Filed Filed 7 Nov 03; US-Patent-Appl-SN-10-703 879

Report No.(s): PB2007-101616; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Apparatus and methods of operation are provided for a cold-crucible-induction melter for vitrifying waste wherein a single induction power supply may be used to effect a selected thermal distribution by independently energizing at least two inductors. Also, a bottom drain assembly may be heated by an inductor and may include an electrically resistive heater. The bottom drain assembly may be cooled to solidify molten material passing therethrough to prevent discharge of molten material therefrom. Configurations are provided wherein the induction flux skin depth substantially corresponds with the central longitudinal axis of the crucible. Further, the drain tube may be positioned within the induction flux skin depth in relation to material within the crucible or may be substantially aligned with a direction of flow of molten material within the crucible.

An improved head design including four shells forming thermal radiation shields and at least two gas-cooled plenums is also disclosed.

NTIS

Drainage; High Temperature; Patent Applications

20070012325 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Temperature-Adaptive Circuits on Reconfigurable Analog Arrays

Stoica, Adrian; Zebulum, Ricardo S.; Keymeulen, Didier; Ramesham, Rajeshuni; Neff, Joseph; Katkooori, Srinivas; June 16, 2006; 11 pp.; In English; Adaptive Hardware and Systems Conference, 16-18 Jun. 2006, Istanbul, Turkey; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39796>

Demonstration of a self-reconfigurable Integrated Circuit (IC) that would operate under extreme temperature (-180 C and 120 C) and radiation (300krad), without the protection of thermal controls and radiation shields. Self-Reconfigurable Electronics platform: a) Evolutionary Processor (EP) to run reconfiguration mechanism; b) Reconfigurable chip (FPGA, FPAA, etc).

Derived from text

Field-Programmable Gate Arrays; Integrated Circuits; Thermal Radiation

20070012331 NASA Stennis Space Center, Stennis Space Center, MS, USA

Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center

Hughes, Mark S.; Davis, Dawn M.; Bakker, Henry J.; Jensen, Scott L.; [2007]; 87 pp.; In English; Mississippi Engineering Society, 25-27 Feb. 2007, Jackson, MS, USA; Original contains color illustrations

Report No.(s): SPPT-8075-0001-ELEC; No Copyright; Avail.: CASI: A05, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012331>

This viewgraph presentation reviews the design of the electrical systems that are required for the testing of rockets at the Rocket Propulsion Facility at NASA Stennis Space Center (NASA SSC). NASA/SSC's Mission in Rocket Propulsion Testing Is to Acquire Test Performance Data for Verification, Validation and Qualification of Propulsion Systems Hardware. These must be accurate reliable comprehensive and timely. Data acquisition in a rocket propulsion test environment is challenging: severe temporal transient dynamic environments, large thermal gradients, vacuum to 15 ksi pressure regimes SSC has developed and employs DAS, control systems and control systems and robust instrumentation that effectively satisfies these challenges.

CASI

Propulsion System Performance; Rocket Test Facilities; Electric Equipment; Systems Engineering; Electrical Engineering

20070012361 NASA Glenn Research Center, Cleveland, OH, USA

Control of Dual-Opposed Stirling Convertors with Active Power Factor Correction Controllers

Regan, Timothy F.; Lewandowski, Edward J.; Schreiber, Jeffrey G.; [2007]; 31 pp.; In English; 4th International Energy Conversion Engineering Conference (IECEC), 26-29 Jun. 2006, San Diego, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): NAS3-03064; WBS 22-972-20-01; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012361>

When using recently-developed active power factor correction (APFC) controllers in power systems comprised of dual-opposed free-piston Stirling convertors, a variety of configurations of the convertors and controller(s) can be considered, with configuration ultimately selected based on benefits of efficiency, reliability, and robust operation. The configuration must not only achieve stable control of the two convertors, but also synchronize and regulate motion of the pistons to minimize net dynamic forces. The NASA Glenn Research Center (GRC) System Dynamic Model (SDM) was used to study ten configurations of dual-opposed convertor systems. These configurations considered one controller with the alternators connected in series or in parallel, and two controllers with the alternators not connected (isolated). For the configurations where the alternators were not connected, several different approaches were evaluated to synchronize the two convertors. In addition, two thermodynamic configurations were considered: two convertors with isolated working spaces and convertors with a shared expansion space. Of the ten configurations studied, stable operating modes were found for four. Three of those four had a common expansion space. One stable configuration was found for the dual-opposed convertors with separate working spaces. That configuration required isochronous control of both convertors, and two APFC controllers were used to

accomplish this. A frequency/phase control loop was necessary to allow each APFC controller to synchronize its associated converter with a common frequency.

Author

Power Factor Controllers; Dynamic Models; Converters; Free-Piston Engines; Stirling Engines; Correction

20070012604 Indiana State Dept. of Health, Indianapolis, IN, USA

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Electrocuted While Attempting to Change a Fuse in a Fuse Box Providing Power to a Fertilizer Mixer/Loader

May 1994; 6 pp.; In English

Report No.(s): PB2007-107197; FACE-94-in-046-01; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A 22-year-old male employee of a feed and grain mill was loading dry fertilizer from an electrically powered mixer/loader into a truck when the auger and conveyor belt suddenly stopped. Evidence suggests, he then attempted to change a fuse in a fuse box located on the side of the building directly behind the loader and five feet above the wet and muddy ground. Indications were the 440-volt AC panel was not de-energized and the decedent received a fatal electrical shock. On May 3, 1994, a 22-year-old male employee of a feed and grain mill was electrocuted attempting to change a fuse in an unmarked 440-volt AC fuse box. The decedent was transported to a local hospital where he was pronounced dead. Officials of the Indiana Department of Labor (IOSHA) were notified May 4, 1994, and a preliminary investigation was done. Officials of the Indiana State Department of Health FACE Program were notified May 12, 1994. A phone call by the FACE investigator to the employer established that an investigation would be conducted May 13, 1994. The feed and grain mill where the incident occurred is located in a rural area of Indiana. The employer has been in the business for fourteen years, including the last five years as owner and manager. The decedent was employed at the grain mill for four years (two years part-time followed by two years full-time). Recommendations and Discussion: (1) Employers should conduct a jobsite survey before starting any work to identify any hazards, implement appropriate control measures and provide subsequent training to employees specific to all identified hazards; (2) Employers should develop, implement and enforce a comprehensive written safety program; (3) Employers should provide additional electrical safety training to those workers working with or around electrical current, including proper rescue procedures.

NTIS

Fertilizers; Mixers

20070012605 Indiana State Dept. of Health, Indianapolis, IN, USA

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Dies of Complications After Receiving Severe Electrical Shock Installing a TV Tower

Nov. 1993; 6 pp.; In English

Report No.(s): PB2007-107195; FACE-93-in-08-001; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A 51-year-old male (the decedent), a co-worker, and the employer were installing a TV tower at the side of a building housing the employer's business. A hole approximately one foot square was pre-dug to set the base of the TV tower. The hole was located about 34 inches away from the building and 20 feet horizontally from an overhead power line. The decedent and co-worker were on the ground positioning the tower, while the employer was on the roof of the building trying to guide and stabilize the movement of the tower. The movement and stabilization of the tower was being accomplished by using a 5/8 inch braided nylon rope secured about of the way up the tower. As the workers were trying to stabilize the TV tower into the pre-dug hole, it fell and contacted one phase of a three phase 7200-volt overhead power line. The electrical current traveled from phase to ground and the decedent and co-worker received a severe electrical shock. The decedent died two weeks later from complications. State FACE investigators concluded to prevent similar occurrences, employers should: (1) Contact utility companies to have power line insulated or de-energized prior to the commencement of any work tasks; (2) Evaluate worksites, identify hazards, and instruct employees in the recognition and avoidance of unsafe working conditions in proximity to overhead power lines; (3) Develop and implement written safety programs designed to enable workers to recognize and avoid hazards, especially electrical hazards.

NTIS

Installing; Television Systems; Towers

20070012626 Oak Ridge National Lab., TN USA

Evaluation of 2005 Honda Accord Hybrid Electric Drive System. FY 2006

Olszewski, M.; Sep. 01, 2006; 34 pp.; In English

Report No.(s): DE2006-891260; No Copyright; Avail.: National Technical Information Service (NTIS)

The Hybrid Electric Vehicle (HEV) program officially began in 1993 as a five-year, cost-shared partnership between the U.S. Department of Energy (DOE) and American auto manufacturers: General Motors, Ford, and Daimler Chrysler. Currently, HEV research and development is conducted by DOE through its FreedomCAR and Vehicle Technologies (FCVT) program. The mission of the FCVT program is to develop more energy efficient and environmentally friendly highway transportation technologies. Program activities include research, development, demonstration, testing, technology validation, and technology transfer. These activities are aimed at developing technologies that can be domestically produced in a clean and cost-competitive manner. The vehicle systems technologies subprogram, which is one of four subprograms under the FCVT program, supports the efforts of the FreedomCAR through a three-phase approach (1) intended to: (1) Identify overall propulsion and vehicle-related needs by analyzing programmatic goals and reviewing industry's recommendations and requirements, then develop the appropriate technical targets for systems, subsystems, and component research and development activities; (2) Develop and validate individual subsystems and components, including electric motors, emission control devices, battery systems, power electronics, accessories, and devices to reduce parasitic losses; and (3) Determine how well the components and subassemblies work together in a vehicle environment or as a complete propulsion system and whether the efficiency and performance targets at the vehicle level have been achieved. The research performed under the vehicle systems subprogram will help remove technical and cost barriers to enable technology for use in such advanced vehicles as hybrid electric, plug-in electric, and fuel-cell-powered vehicles.

NTIS

Electric Batteries; Electric Motor Vehicles; Electric Motors

20070012779 Georgia Inst. of Tech., Atlanta, GA, USA

Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report

Chou, M. Y.; Nov. 12, 2006; 16 pp.; In English

Contract(s)/Grant(s): FG02-01ER45930

Report No.(s): DE2006-894945; DOE/ER/45930-4; No Copyright; Avail.: Department of Energy Information Bridge

The goal of this project is to study electron correlation in a confined geometry (quantum dots) within the two-dimensional quantum well in the sandwiches of two semiconductor materials. For these systems one is able to tune the electronic properties by controlling the size and the electron number, creating tremendous potential for novel applications. Much effort in this emerging field has been devoted to producing entangled states that are required for quantum information processing. At the same time, new physical phenomena have emerged from these artificial structures. Adding electrons to a quantum dot is more complicated than filling up discrete energy levels due to electron correlation. Therefore, our project is focusing on employing the state-of-the-art quantum Monte Carlo methods to study the electron-electron interaction. A close examination of the breakdown of Hund's rules and electron localization has been conducted in our simulations. The results are summarized in this report.

NTIS

Electronic Structure; Monte Carlo Method; Quantum Dots; Correlation

20070012829 LightSmyth Technologies, Inc., Eugene, OR USA

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems

Mossberg, Thomas; Feb 15, 2007; 58 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W31P4Q-05-C-R149; ARPA ORDER-2913-14

Report No.(s): AD-A462951; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462951>

Recent advances in photo lithographic fabrication and planar waveguides have created a powerful opportunity. For the first time it is possible to generate arbitrary computer-designed, waveguide volume holograms and to do so robustly and at low cost. Holographic Bragg Reflectors (HBRs) comprise an exemplary lithographically scribed fully integrated holographic device useful for multiplexing of wavelength differentiated optical signals and general purpose spectral filtering. HBRs provide both a flexible spectral filtering function and a signal routing/imaging function in the slab waveguide environment. The present Phase II effort has harnessed new fabrication tools to perfect disruptive HBR-based multiplexer products for DoD avionics, optical communications systems computer data communications and local area networks. The devices can address both single and multimode systems providing high levels of functionality and reliability at low cost. In multi-mode configuration, the devices may be used to enhance and retrofit the existing optical communication systems in aircraft and ships as well as empower powerful new cost effective solutions in both commercial and military data transport systems. HBR-based multiplexing is empowering to WDM-on-a-chip hybrid integration enabling compact, low-cost, high capacity optical transport specialized to small network environments. As a result of the present effort, the first fully integrated Course Wavelength

Division Multiplexer compatible with single-mode systems and competitive with multiplexers constructed from discrete thin film filters has been developed and demonstrated. The silica-on-silicon format was employed. A multitude of methods for providing precisely tailored, that pass bands were successfully demonstrated. Design tools necessary to implement aspheric diffractive contours and thereby minimize imaging aberrations were developed. Fabrication yields were examined and factors limiting same identified.

DTIC

Bragg Reflectors; Code Division Multiple Access; Holography; Optical Communication; Optical Equipment; Reflectors; Wavelength Division Multiplexing

20070012873 Georgia Inst. of Tech., Atlanta, GA USA

Low-Voltage Ferroelectric Phase Shifters From L- to C-Band

Kenney, J S; Yoon, Yong K; Ahn, Minsik; Allen, Mark G; Zhao, Zhiyong; Wang, Xiaoyan; Hunt, Andrew; Kim, Dongsu; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33615-01-M-1950

Report No.(s): AD-A463032; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463032>

This paper describes the design, fabrication and test results of a family of integrated low voltage ferroelectric phase shifters ranging in frequency of operation from 0.7 GHz to 6 GHz. All devices use a common material system of Ba_xSr_{1-x}TiO₃ (BST) thin-films on Al₂O₃ (sapphire), allowing integration with high-Q inductors and other passive microwave elements. Novel bias structures have also been developed to reduce the voltages required to tune the materials, making them more attractive for avionics systems applications.

DTIC

Barium Titanates; C Band; Ferroelectric Materials; Ferroelectricity; Low Voltage; Phase Shift Circuits; Strontium Titanates

20070012906 Dow Corning Compound Semiconductor Solutions, LLC, Midland, MI USA

Q5 Known Good Substrates

Loboda, Mark; Carlson, Eric; Chung, Gilyong; Russell, Brian; Feb 27, 2007; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-C-0324

Report No.(s): AD-A463083; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463083>

The Known Good Substrates (KGS) program is on track technically and financially with program tasks. A no-cost time extension was processed from February to March 31, 2007. The remaining Q3 and Q4 wafers were delivered after a delay due to equipment down time. Q4 wafer metrology and characterization was completed. Results are reported from first device fabrication lots. Many subcontractors are ramping down activities as their work nears completion.

DTIC

Silicon Carbides; Substrates; Wafers

20070012962 Naval Undersea Warfare Center, Newport, RI USA

Dynamic Response of an Insonified Sonar Window Interacting with a Tonpilz Transducer Array

Hull, Andrew J; Jan 3, 2007; 38 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463290; NUWC-NPT-TR-11781; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463290>

This report derives and evaluates an analytical model of a sonar window in contact with an array of Tonpilz transducers. The window is fully elastic so that all wave components are present in the analysis. The system is insonified with a plane acoustic wave so that the sonar system is operating in an acoustic receive mode. The output of the model is a transfer function of a transducer element output voltage divided by input pressure versus arrival angle and frequency. This model is intended for analysis of sonar systems that are to be built or modified for broadband processing. The model is validated at low frequency with a comparison to a previously derived thin plate model. Once this is done, an example problem is studied so that the effects of higher order wave interaction with acoustic reception can be understood. It was found that these higher order waves can cause multiple nulls in the acoustic cone and that their locations in the arrival angle-frequency plane can be determined. The effect of these nulls in the beam pattern of the array is demonstrated. This analysis is beneficial because it shows where a sonar

system can operate without being adversely effected by dynamic effects in the sonar window.

DTIC

Dynamic Response; Sonar; Transducers; Ultrasonic Radiation

20070013140 Naval Postgraduate School, Monterey, CA USA

Variable Resolution Direction Finding Using the Robust Symmetrical Number System

Lee, Anthony; Dec 2006; 119 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462642; No Copyright; Avail.: CASI: [A06](#), Hardcopy

A digital implementation of a phase sampling interferometer antenna system based on the Robust Symmetrical Number System (RSNS) is built using commercial-off-the-shelf (COTS) items. The RSNS-based direction finding (DF) system uses short baselines to achieve a high resolution DF capability in a physically compact system for use as stand-in sensors on unmanned aerial vehicles. The RSNS inherent integer Gray code property minimizes the possible encoding errors and adds a robustness to the accuracy of the estimated Angle of Arrival (AOA). A digital architecture using quadrature demodulators and real-time controllers provide greater flexibility for signal processing and allows for the implementation of a new virtual spacing algorithm. The virtual spacing concept changes the RSNS moduli values to implement a virtual antenna spacing without having to physically change the antenna element spacing. This enables higher resolution DF in circumstances where the Signal-to-Noise Ratio (SNR) is high enough to provide error free coding of the AOA. Two four element, digital 3-channel interferometer prototype systems were constructed and tested in the NPS anechoic chamber. The first antenna array is designed using pairwise relatively prime (PRP) moduli. When an extension of the virtual spacing concept for application to N-channel systems was successfully resolved, a second 3-channel array was built using non-PRP moduli for evaluating the performance of the virtual spacing concept. The simulated and experimental results, hardware implementation and testing procedures are presented in this thesis. Results for the first array show that the RSNS-based DF system is able to provide 0.7 degree RMS resolution with a baseline of 66 cm. For the second virtual spacing array, the short physical baseline of 14 cm was sensitive to noise and antenna spacing errors.

DTIC

Antenna Arrays; Antennas; Direction Finding; Interferometry

20070013187 Army Research Lab., Aberdeen Proving Ground, MD USA

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload

Davis, Bradley M; Feb 2007; 67 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-62716AH70

Report No.(s): AD-A463244; ARL-TR-4022; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Two experiments were conducted to assess the effects of navigation display modality on navigation performance, situation awareness, mental workload, and modality preference. Directional cues to a series of waypoints were provided visually, aurally, and tactilely in the within-subjects design. Each experiment was performed in a virtual environment by U.S. Army Soldiers, 14 in the first experiment, 18 in the second experiment. Results from both experiments indicate that augmented visual displays reduced time to complete navigation, maintained situation awareness, and drastically reduced mental workload in comparison to the other display modalities.

DTIC

Auditory Perception; Auditory Signals; Display Devices; Mental Performance; Military Personnel; Navigation; Visual Acuity; Visual Stimuli; Workloads (Psychophysiology)

20070013248 Arkansas Univ., Fayetteville, AR USA

Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells

Manasreh, Omar; Dec 31, 2006; 34 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0002

Report No.(s): AD-A463446; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We have investigated the optoelectronic applications of interband and intersubband transitions in III-V semiconductors quantum wells and quantum dots. The research efforts included the investigation of intersubband transitions in GaN/AlGaIn multiple quantum wells for the 1.3 and 1.5 micron spectral ranges. These wavelengths are important for optical communications. Furthermore, we investigated single wall carbon nanotubes for possible use as space-based solar cell. The final report contains detail discussions of the results obtained during the last three years. At the end of the report, we listed

our professional activities including technical papers, books, symposia, invited talks, and students supported by the grant.
DTIC

Nanostructures (Devices); Optical Properties; Quantum Wells; Semiconductors (Materials)

20070013275 Maryland Univ., College Park, MD USA

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays

Balachandran, B; Jun 30, 2006; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0181; F30602-02-C-0016

Report No.(s): AD-A463492; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Oscillations of clamped-clamped and free-free micro-electromechanical resonators and resonator arrays have been studied in this effort. Piezoelectric actuation is used to excite these resonator structures on the input side and piezoelectric sensing is carried out on the output side. Composite structural models have been developed for these filters, and analyses has been carried out to explain experimental observations of nonlinear phenomena as well as to guide the design of these filters are presented. Semi-analytical design tools for micro-electromechanical resonators and micro-electromechanical resonator arrays have been developed. The phenomenon of intrinsic localized modes in resonator arrays has also been studied, and it is shown that these modes can be explained as forced nonlinear vibration modes. The research findings can open the doors to new resonator array designs.

DTIC

Microelectromechanical Systems; Nonlinear Systems; Nonlinearity; Oscillations; Piezoelectricity; Resonators

20070013296 Texas Univ. at Dallas, Richardson, TX USA

Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms

Collins, Carl B; Davanloo, Farzin; Oct 31, 2006; 42 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0288

Report No.(s): AD-A463533; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In this work, efforts were concentrated upon exploration and examinations of the impedance parameter space and output pulse characteristics of the Blumlein devices to facilitate development of reliable pulsers capable of generating intense ultra wideband electric fields. Output pulse characteristics available from our Blumlein pulsers with different number of lines, line impedances and switching devices were examined. The range of pulse characteristics that may be of interest for Bioelectric and Isomer Research applications were recorded. Issues concerning the switch longevity were studied by fabrication and testing the GaAs photoconductive switches treated with the amorphous diamond. Longevity tests were performed and results for the switch lifetime demonstrated a significant improvement with the application of amorphous diamond. In addition, we studied and surveyed various methods and geometries for non-intrusive electric field delivery and flash x-ray production. Low impedance x-ray diodes were designed and implemented. Output waveforms and x-ray generation were examined by the proper matching of diodes to Blumlein pulsers commutated by thyratrons and/or photoconductive switches. Ultra-fast rising x-ray pulses were produced and studied.

DTIC

Electric Fields; Impedance; Modulators; Waveforms

20070013316 Brown Univ., Providence, RI USA

Phonon Enhancement of Electronic and Optoelectronic Devices

Belenky, G; Hu, Q; Luryi, S; Maris, H; Nurmikko, A; Pei, S-S S; Zaslavsky, A; Dec 2006; 115 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9620-00-1-0331

Report No.(s): AD-A463584; No Copyright; Avail.: CASI: [A06](#), Hardcopy

This MURI program began with the premise that extensive opportunities exist to transform the problems generally associated with phonons presenting an overhead into a distinct benefit for substantial enhancement of a broad range of optoelectronic and electronic devices. Our explicit goal and objective is to provide a significant improvement and major technological impact to the performance of a wide spectrum of advanced and novel semiconductor optoelectronic/electronic devices, by explicitly focusing on the role of phonon assisted and phonon dominated processes that control the functionality and applications of such devices. The devices range from quantum cascade and intersubband mid-IR lasers to new THz frequency laser sources, from semiconductor lasers in the blue and near ultraviolet to high power microwave PETs, to novel ultrahigh speed bipolar tunneling transistors. Additionally, new physical phenomena is being studied in which electron-

electron interaction, crucial for ballistic and coherent electronic devices, is spectroscopically characterized via the electron-phonon interaction. The multi-university team was organized specifically to integrate a potent core of scientific expertise in phonon science, both experiment and theory in terms of the interaction of phonons with the electronic degrees of freedom in semiconductor nanostructures and high speed, high power devices.

DTIC

Augmentation; Bipolar Transistors; Degrees of Freedom; Electron Scattering; Electro-Optics; Nanostructures (Devices); Optoelectronic Devices; Phonons; Semiconductor Lasers

20070013317 Stanford Univ., Stanford, CA USA

Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications

Fayer, Michael D; Sep 10, 2006; 4 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0242-P00001

Report No.(s): AD-A463590; No Copyright; Avail.: CASI: [A01](#), Hardcopy

Funds from a DURIP equipment grant were used to augment the ultrafast IR 2D vibrational echo spectrometer. The major improvement involved a new dual MOT array detector composed of two 32 x 1 element MCT IR detector arrays. The dual array makes it possible to improve signal-to-noise ratio in the heterodyne detection of the vibrational echo signal. To implement the revamping of the system, new optics to implement the two beam geometry were put in place and precision translation stages required to control the path lengths to fractions of a wavelength of light obtained. The instrument has been used make the first measurements of ultrafast chemical exchange, making it possible to study fast solute solvent complex dynamics and isomerization in room temperature solutions under thermal equilibrium conditions.

DTIC

Infrared Spectrometers; Molecular Dynamics; Oscillators; Signal to Noise Ratios; Spectrometers; Vibration

20070013324 University of Southern California, Los Angeles, CA USA

Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays

Madhukar, A; Konkar, A; Campbell, J C; Chang, Y C; Wang, W I; Jun 30, 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-98-1-0474

Report No.(s): AD-A463604; No Copyright; Avail.: CASI: [A02](#), Hardcopy

During the above-noted period of this Final Technical Report, the following salient milestones were reached: (1) Introduced and demonstrated the concept of injecting electrons into the quantum dot (OD) active infra-red absorbing region from bracketing doped contact layers (to suppress unwanted dark current) leaving the QD region undoped; (2) Introduced and demonstrated the benefits of the concepts of (a) strain-relieving OD capping layers, (b) current blocking layers, and (c) lateral potential confinement layer for tailoring the OD electronic response to the desired IR response; (3) Demonstrated high performance ODIP devices in the mid and longwavelength IR regions; (4) Demonstrated voltage-tunable mid and long IR dual wavelength ODIPs.

DTIC

Infrared Detectors; Molecular Beam Epitaxy; Quantum Dots; Semiconductors (Materials)

20070013366 L-3 Communications Corp., Torrance, CA USA

Congressional-Microwave Vacuum Electronics Power Res. Ini.) TWT Coatings Improvement Investigation

Feb 1, 2007; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-C-0173; Proj-2301

Report No.(s): AD-A463758; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Gain stability has long been identified as a key attribute for successful long-term operation of both space and terrestrial helix traveling wave tubes (TWTs), whose mission life may extend to 15 or more years. Gain change associated with attenuator (carbon) thin film resistivity change has been observed for at least 30 years; however no definitive experimental evidence to support the various resistance change theories has been available. Using a modified ion source, changes in film resistivity caused by low energy hydrogen ion bombardment of the carbon attenuator have now been positively identified as the cause of gain growth in helix TWTs. Carbon films experimentally damaged by ion bombardment compare identically to those removed from TWTs with thousands of operating hours. An unusual thermal annealing effect seen in TWT films has also

been duplicated. Two potential methods to mitigate gain change have also been proposed based on this work.
DTIC

Microwaves; Power Gain; Traveling Wave Tubes; Vacuum

20070013482 Henricks, Slavin, and Holmes, LLP, El Segundo, CA, USA
Methods and Systems for Tracking Signals with Diverse Polarization Properties

Dybdal, R. B.; Pidhayny, D. D.; 22 Mar 04; 12 pp.; In English

Contract(s)/Grant(s): NOAA-50-SPNA-0-00012

Patent Info.: Filed Filed 22 Mar 04; US-Patent-Appl-SN-10-807-587

Report No.(s): PB2007-105902; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods and systems for tracking signals with diverse polarization properties address both sensitivity and antenna tracking performance issues. In one embodiment, complex weightings for matching a polarization of an incident signal on a data channel are determined, and the complex weightings are applied to a tracking channel such that an antenna system polarization is matched to the polarization of the incident signal. In another embodiment, orthogonally polarized tracking channel components of an incident signal are processed to make a determination as to which of the orthogonally polarized tracking channel components is stronger, and this determination is used to select a polarization of a data channel to reduce a polarization mismatch loss.

NTIS

Polarization; Signal Transmission; Tracking (Position); Methodology

20070013486 Swedish Defence Research Establishment, Linköping, Sweden
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005)

Ahlberg, J.; Renhorn, I.; Svensson, T.; Winzell, T.; Carlsson, G.; Dec. 2005; 34 pp.; In Swedish

Report No.(s): PB2007-105505; FOI-R-1815-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes the project 'Multispectral infrared and electro-optical sensors' that was executed during 2005. IR and electro-optics provide advanced technical solutions for localization and identification, including night-capacity reconnaissance. The project included several sub-areas: Modeling and simulation of sensors to enable methods on simulated data; Signal/image analysis with the purpose of detecting, classifying, identify, and geo-localize targets, primarily ground targets. The analysis is applied to IR and electro-optical sensors in the entire wavelength range from visible light to thermal long-wave infrared; Sensor development with the long-term purpose to demonstrate high-performance adaptive sensor systems in the entire spectral range from visible light to thermal infrared; Data acquisition in the form of measurements and field trials. The aim of the project has been to cover the entire chain from sensors and measurement to image analysis, including modeling and simulation of the chain in order to be able to simulate scenarios that are not preferable or possible to measure.

NTIS

Infrared Detectors; Electro-Optics; Signal Analysis; Sensors

20070013495 Army Aviation and Missile Command, Redstone Arsenal, AL, USA
Hybrid-Phased Communication Array

Rock, J. C.; 3 Mar 05; 6 pp.; In English

Patent Info.: Filed Filed 3 Mar 05; US-Patent-Appl-SN-11-071-428

Report No.(s): PB2007-101689; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A communication module is provided with a Transmit/Receive (T/R) element fabricated from pseudomorphic HEMT, High Electron Mobility Transistor technology (PHEMT). The T/R element drives multiple Radio Frequency MEMS switch-based phasing elements. Each of the phasing elements connects to a corresponding radiation element. A large quantity of the communication elements can be placed on a single substrate chip so as to provide for a reliable and cost effective device.

NTIS

Communication Equipment; Phased Arrays; Modules; Fabrication

20070013497 Epping, Hermann, Fischer, Munich, Germany
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination

Krummacher, B. C.; Mathai, M.; Choong, V. E.; Choulis, S. A.; 22 Jun 05; 17 pp.; In English

Contract(s)/Grant(s): DE-FC26-04NT41947

Patent Info.: Filed Filed 22 Jun 05; US-Patent-Appl-SN-11-159-557

Report No.(s): PB2007-101688; No Copyright; Avail.: CASI: [A03](#), Hardcopy

What is disclosed is an electroluminescent apparatus comprising: an OLED device emitting light in the blue and green spectrums; and at least one down conversion layer, said down conversion layer absorbing at least part of the green spectrum light and emitting in at least one of the orange spectra and red spectra.

NTIS

Light Emitting Diodes; Electroluminescence; Fabrication; Mechanical Devices

20070013500 Oak Ridge National Lab., TN USA

FreedomCAR Advanced Traction Drive Motor Development Phase I. FY 2006

Olszewski, M.; Sep. 01, 2006; 95 pp.; In English

Report No.(s): DE2006-891263; No Copyright; Avail.: National Technical Information Service (NTIS)

The overall objective of this program is to design and develop an advanced traction motor that will meet the FreedomCAR and Vehicle Technologies (FCVT) 2010 goals and the traction motor technical targets. The motor specifications are given in Section 1.3. Other goals of the program include providing a cost study to ensure the motor can be developed within the cost targets needed for the automotive industry. The program has focused on using materials that are both high performance and low costs such that the performance can be met and cost targets are achieved. In addition, the motor technologies and machine design features must be compatible with high volume manufacturing and able to provide high reliability, efficiency, and ruggedness while simultaneously reducing weight and volume. Weight and volume reduction will become a major factor in reducing cost, material cost being the most significant part of manufacturing cost at high volume. Many motor technology categories have been considered in the past and present for traction drive applications, including: brushed direct current (DC), PM (PM) brushless dc (BLDC), alternating current (AC) induction, switched reluctance and synchronous reluctance machines. Of these machine technologies, PM BLDC has consistently demonstrated an advantage in terms of power density and efficiency. As rare earth magnet cost has declined, total cost may also be reduced over the other technologies. Of the many different configurations of PM BLDC machines, those which incorporate power production utilizing both magnetic torque as well as reluctance torque appear to have the most promise for traction applications. There are many different PM BLDC machine configurations which employ both of these torque producing mechanisms; however, most would fall into one of two categories--some use weaker magnets and rely more heavily on reluctance torque (reluctance-dominant PM machines), others use strong PMs and supplement with reluctance torque (magnet-dominant PM machines). This report covers a trade study that was conducted in this phase I program to explore which type of machine best suits the FCVT requirements.

NTIS

Propulsion System Configurations; Propulsion System Performance; Traction

20070013505 Wolf Greenfield and Sacks, PC, Boston, MA, USA

Electromechanical Actuators

Chiang, Y. M.; Sheets, S. A.; Farrey, G. W.; Haggod, N. W.; Soukhojak, A.; 5 Sep 03; 61 pp.; In English

Contract(s)/Grant(s): ONR-N00014-97-0989

Patent Info.: Filed Filed 5 Sep 03; US-Patent-Appl-SN-10-635-240

Report No.(s): PB2007-101595; No Copyright; Avail.: CASI: [A04](#), Hardcopy

This invention relates to a class of lead-free or low lead perovskite oxide compounds useful to electromechanical actuators. It also relates to composite actuators utilizing these compounds in the form of oriented polycrystals or crystallites. The invention relates to compositions exhibiting improved strain coefficients, strain actuation, and other properties relating to piezoelectric or electrostrictive performance.

NTIS

Actuators; Electromechanical Devices; Electrostriction

20070013510 Marshall, Gerstein and Borun, LLP, Chicago, IL, USA

Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals

Burnet, C. S.; Powell, C. T.; 7 Apr 04; 21 pp.; In English

Contract(s)/Grant(s): N00019-02-C-3003

Patent Info.: Filed Filed 7 Apr 04; US-Patent-Appl-SN-10-819-632

Report No.(s): PB2007-105923; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In a method for estimating a parameter based on signals received from redundant sensors, at least a first sensed signal and

a second sensed signal are received from at least corresponding first and second redundant sensors. The first sensed signal and the second sensed signal are indicative of the parameter, wherein the first sensed signal has associated therewith a first accuracy, wherein the second sensed signal has associated therewith a second accuracy. At least a reference signal indicative of the parameter is received, wherein the reference signal has associated therewith a reference accuracy. A weighting is determined based on at least the first sensed signal, the second sensed signal, and based on at least one of the first accuracy, the second accuracy, and the reference accuracy. An estimate of the parameter is generated as a weighted average, according to the weighting, of at least a value of the first sensed signal, a value of the second sensed signal, and a value of the reference signal.

NTIS

Estimating; Parameter Identification; Methodology; Signals; Redundant Components

20070013518 California Univ., Berkeley, CA, USA

Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices

Heger, A. J.; Plaxco, K. W.; 25 Mar 04; 23 pp.; In English

Contract(s)/Grant(s): NSF-DMR-0099843; NIH-GM 62958-01

Patent Info.: Filed Filed 25 Mar 04; US-Patent-Appl-SN-10-810-333

Report No.(s): PB2007-101654; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A reagentless, reusable bioelectronic DNA, or other oligonucleotide sequence sensor is disclosed. The sensor includes an oligonucleotide probe tagged with a electroactive, redoxable moiety, self-assembled on or near an electrode. This surface-confined oligonucleotide probe structure undergoes hybridization-induced conformational change in the presence of the target oligonucleotide sequence which change the electron-transfer distance between the redoxable moiety and the electrode thereby providing a detectable signal change. In an alternative embodiment, the target can harbor the redoxable moiety. In a preferred application, the target sequence is associated with an object and its detection is correlated with the authenticity of the object.

NTIS

Bionics; Computer Information Security; Deoxyribonucleic Acid; Electronic Equipment

20070013538 Northrop Corp., Los Angeles, CA, USA

Carbon Nanotube Resonator Transistor and Method of Making Same

Adam, J. D.; 2 Mar 05; 10 pp.; In English

Contract(s)/Grant(s): JPL/DARPA-30011555

Patent Info.: Filed Filed 2 Mar 05; US-Patent-Appl-SN-11-068-750

Report No.(s): PB2007-101683; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A resonant transistor includes a substrate, a source and a drain formed on the substrate, an input electrode and a carbon nanotube gate. A gap is formed between the source and the drain. The input electrode is formed on the substrate. The carbon nanotube gate is clamped on one end by a contact electrode and positioned, preferably cantilevered, over the gap and over the input electrode.

NTIS

Carbon Nanotubes; Resonators; Transistors

20070013539 Steptoe and Johnson LLP, Washington, DC, USA

Method and System for Transferring a Patterned Material

Coe-Sullivan, S.; Bawendi, M. G.; Bulovic, V.; 20 Oct 05; 16 pp.; In English

Contract(s)/Grant(s): NSF-6896872

Patent Info.: Filed Filed 20 Oct 05; US-Patent-Appl-SN-11-253-612

Report No.(s): PB2007-101678; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method of transferring a material to a substrate includes selectively depositing the material on a surface of an applicator and contacting the surface of the applicator to the substrate. The material can form a pattern on the surface of the applicator. The pattern can be preserved when the material is transferred to the substrate. The material can be deposited on the applicator by ink jet printing.

NTIS

Substrates; Transferring; Patterns

20070013572 Boston Univ., Boston, MA, USA

Carbon Nanotube Nanoelectrode Arrays

Ren, Z.; Lin, Y.; Yantasee, W.; Liu, G.; Lu, F.; 20 Dec 04; 42 pp.; In English

Contract(s)/Grant(s): NSF-CMS-0219836; NIH CA-97945-01

Patent Info.: Filed 20 Dec 04; US-Patent-Appl-SN-11-017-480

Report No.(s): PB2007-105943; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention relates to microelectrode arrays (MEAs), and more particularly to carbon nanotube nanoelectrode arrays (CNT-NEAs) for chemical and biological sensing, and methods of use. A nanoelectrode array includes a carbon nanotube material comprising an array of substantially linear carbon nanotubes each having a proximal end and a distal end, the proximal end of the carbon nanotubes are attached to a catalyst substrate material so as to form the array with a pre-determined site density, wherein the carbon nanotubes are aligned with respect to one another within the array; an electrically insulating layer on the surface of the carbon nanotube material, whereby the distal end of the carbon nanotubes extend beyond the electrically insulating layer; a second adhesive electrically insulating layer on the surface of the electrically insulating layer, whereby the distal end of the carbon nanotubes extend beyond the second adhesive electrically insulating layer; and a metal wire attached to the catalyst substrate material.

NTIS

Carbon Nanotubes; Chemical Detection; Arrays; Electrodes

20070013585 Defence Science and Technology Organisation, Edinburgh, Australia

Investigations into Novel Multi-Band Antenna Designs

Kyprianou, Ross; Yau, Bobby; Alexopoulos, Aris; Verma, Akhilesh; Bates, Bevan D; Aug 2006; 40 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462902; DSTO-TN-0719; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462902>

We investigate the possibility of using fractal geometry to construct radiating elements for phased array radar. We seek to understand whether the characteristics of individual fractal designs can give rise to multi-band or broadband performance and we do this by looking at Hilbert curves, log-periodic and circular-log-periodic radiating elements. We present the theory and discuss software that has been developed in order to model fractal elements and we present our findings accordingly.

DTIC

Antenna Design; Antennas

20070013587 Defence Research and Development Canada, Ottawa, Ontario Canada

Array of Laminated Waveguides for Implementation in LTCC Technology

Clenet, Michel; Antar, Yahia M; Lee, David; Nov 2006; 79 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462936; DRDC-TM-2006-227; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462936>

This document reports on the study of a five-element array prototype developed for communications in K-band and suitable for LTCC technology. The radiating element is an open waveguide realized in laminated technology. A novel coaxial-to-waveguide transition has also been designed as feed port for measuring the prototypes. The design, analysis, fabrication process and measurement of this antenna element were described in a previous report. To summarize, the element exhibits a 1 GHz bandwidth around a 20.7 GHz centre frequency. The element radiation pattern indicates a gain of 2.7 dBi. This new antenna is suitable for brick architecture array configuration. In an array configuration the input impedance of each radiating element is slightly perturbed by the proximity of the other antennas. The mutual coupling between the elements, however, remains below 20 dB across the bandwidth. The simulated boresight radiation pattern of a five-element array is stable over the bandwidth and the gain reaches 9.2 dBi at 20.7 GHz. These results are confirmed by the measurement. The scanned radiation patterns obtained by simulation show a good behaviour of this array for scan angles up to 50C. The measured radiation patterns for several scan angles demonstrate the scanning capability of this array.

DTIC

Antenna Components; Antenna Radiation Patterns; Laminates; Phased Arrays; Telecommunication; Waveguides

20070013597 Executive Office of the President, Washington, DC USA

The National Nanotechnology Initiative. Research and Development Leading to a Revolution in Technology and Industry. Supplement to the President's 2006 Budget

Mar 2005; 62 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462648; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The National Nanotechnology Initiative (NNI) is a multi-agency U.S. Government program aimed at accelerating the discovery, development, and deployment of nanoscale science, engineering, and technology. As outlined in the recently completed NNI Strategic Plan, the NNI's goals are to maintain a world-class research and development (R&D) program; to facilitate technology transfer; to develop educational resources, a skilled workforce, and supporting research infrastructure and tools; and to support responsible development of nanotechnology. The NNI Strategic Plan also outlines seven major subject areas under which related projects are grouped, called Program Component Areas (PCAs). Investment in these PCAs is essential to achieving the NNI goals. This document is a supplement to the President's 2006 Budget Request submitted to Congress on February 7, 2005. It gives a description of the activities underway in 2005 and planned for 2006 by the Federal Government agencies participating in the National Nanotechnology Initiative, primarily from a programmatic and budgetary perspective. It is based on the new NNI Strategic Plan released in December 2004 and reports requested investments for 2006 by Program Component Area (PCA), as called for under the provisions of the 21st Century Nanotechnology Research and Development Act (Public Law 108-153). This report also includes information on spending for the development and acquisition of research facilities and instrumentation, a discussion of external reviews of the NNI and how recommendations have been addressed, a description of how the NNI participating agencies are implementing the NNI Strategic Plan, and a discussion of nanotechnology R&D funding through the Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs.

DTIC

Industries; Nanotechnology

20070013598 Army Aviation and Missile Research Development Engineering Center, Redstone, AL USA
Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program

Pittman, William C; Feb 2007; 168 pp.; In English

Report No.(s): AD-A463124; TR-AMR-SG-07-03; No Copyright; Avail.: CASI: [A08](#), Hardcopy

The Millimeter and Microwave Monolithic Integrated Circuits (MIMIC) program had its origins in the concern of the smart weapons community for the affordable production of millimeter wave missile seekers, but the broad-based applicability of the technology to radar, communications, countermeasures, and counter-countermeasures was recognized in the formulation of the program. The program was initiated in the turbulent 1980s during the period of high technology trade deficits (and the defense buildup) that created an atmosphere of crisis leading to searching examinations of the reasons for the defeat of the USA in the global marketplaces. The resultant initiatives by the Congress, the Executive and the private sector created a favorable climate for the execution of the program that featured a unique architecture in which goals were framed in system terms to provide the linking mechanism between materials research, device design, modeling simulation and testing leading to application in the four military application areas cited. The program provides a useful model that could be applied to other programs designed to achieve either civilian or military objectives. The report traces the evolution of the technology from program formulation when the market was principally military to completion when the market was principally commercial, leaving the semiconductor industry well positioned to cope with the defense cutbacks and downsizing. The report concludes with an analysis of the elements that made the program a success.

DTIC

Defense Program; Homing Devices; Integrated Circuits; Microwave Circuits; Microwaves; Millimeter Waves

20070013604 Air War Coll., Maxwell AFB, AL USA

Electromagnetic Pulse Threats in 2010

Miller, Colin R; Nov 2005; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463475; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Current U.S. military transformation strategy centers on information dominance, network-centric warfare, and expeditionary operations. Certainly, adversaries learned from Saddam's poor decision to face American forces head-on and will increasingly employ asymmetric attacks to defeat U.S. forces in the future. Electromagnetic pulse (EMP) weapons represent one of the most likely and potentially devastating opportunities for this type of attack in the near future. Ranging from sophisticated intercontinental nuclear weapons specifically designed to generate EMP effects to relatively crude and cheap electromagnetic bombs, these weapons can destroy all electronic devices within a target area as small as an automobile or as large as the continental USA. As U.S. forces continue to modernize and rely on electronic systems, it will become increasingly probable that an adversary will use EMP to strike at America's Achilles heel. This paper addresses the threat EMP weapons will pose to U.S. expeditionary operations in the near future. It begins by discussing the nature of EMP and its effect on vulnerable systems, and then outlines the different methods of generating EMP while categorizing them by probability of use, lethal range, types of (electronic) targets they affect, and who is likely to use them. The paper considers three near-term

scenarios for adversary use of EMP and recommends cost-effective response measures. It proposes a diplomatic policy to levy drastic consequences on the perpetrator of an EMP attack, rapid establishment of an EMP-hardened expeditionary force, hardening critical elements of civil infrastructures, integration of EMP attack response in large-scale training scenarios, and congressional action to establish and mandate compliance with EMP hardening standards for future military and civilian systems.

DTIC

Electromagnetic Pulses; High Altitude; Weapons

34

FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

20070011440 Naval Postgraduate School, Monterey, CA USA

Experimental Investigation and Numerical Predication of a Cross-Flow Fan

Yu, Huai-Te; Dec 2006; 131 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462582; No Copyright; Avail.: CASI: [A07](#), Hardcopy

The concept of a fan-wing aircraft configuration for the purpose of vertical takeoff and landing has drawn much attention. Recently, more investigations revealed that a cross-flow fan (CFF) was capable of providing the propulsion. Several characteristics of the off-design performance of a CFF were experimentally measured, but insufficient numerical predictions were obtained. In the present study, the commercial CFD software ANSYS CFX was employed to calculate the unsteady flow through a CFF with a sliding mesh incorporated. The results of the CFD showed the necessity to re-investigate the cross-flow fan with 12-inch diameter, 1.5-inch span and 30 blades, and additional measurement locations were implemented to carry out a more accurate experiment. A new digital sensor array was used to record the pressures within the experiment, which contributed to the high fidelity of the present data. Successful comparisons were made between the predicted and measured performance at various rotational speeds from an open throttle position to a setting at stall. Visualization of the computed flow field showed where stall occurred, both within the rotor and in the exhaust duct.

DTIC

Cross Flow; Computational Fluid Dynamics; Fans; Numerical Analysis

20070011449 Clarkson Univ., Potsdam, NY, USA

Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient

Moumen, Nadjoua; Subramanian, R, Shankar; MLaughlin, John B.; Langmuir 2006; February 9, 2006; Volume 22, pp. 2682-2690; In English

Contract(s)/Grant(s): NAG3-2703; Copyright; Avail.: Other Sources

ONLINE: <http://dx.doi.org/10.1021/la053060x>

Results from experiments performed on the motion of drops of tetraethylene glycol in a wettability gradient present on a silicon surface are reported and compared with predictions from a recently developed theoretical model. The gradient in wettability was formed by exposing strips cut from a silicon wafer to decyltrichlorosilane vapors. Video images of the drops captured during the experiments were subsequently analyzed for drop size and velocity as functions of position along the gradient. In separate experiments on the same strips, the static contact angle formed by small drops was measured and used to obtain the local wettability gradient to which a drop is subjected. The velocity of the drops was found to be a strong function of position along the gradient. A quasi-steady theoretical model that balances the local hydrodynamic resistance with the local driving force generally describes the observations; possible reasons for the remaining discrepancies are discussed. It is shown that a model in which the driving force is reduced to accommodate the hysteresis effect inferred from the data is able to remove most of the discrepancy between the observed and predicted velocities.

Author

Drop Size; Solid Surfaces; Wettability; Mathematical Models; Hydrodynamics; Motion

20070011612 NASA Johnson Space Center, Houston, TX, USA

SUPG Finite Element Simulations of Compressible Flows

Kirk, Brnjamin, S.; November 9, 2006; 46 pp.; In English; MIT Aerospace Engineering Department Seminar, 8-9 Feb. 2007, Cambridge, MA, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: [A03](#),

Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011612>

The Streamline-Upwind Petrov-Galerkin (SUPG) finite element simulations of compressible flows is presented. The topics include: 1) Introduction; 2) SUPG Galerkin Finite Element Methods; 3) Applications; and 4) Bibliography.

CASI

Finite Element Method; Galerkin Method; Simulation; Compressible Flow

20070011774 Research and Technology Organization, Neuilly-sur-Seine, France

Unsteady Motions in Combustion Chambers for Propulsion Systems

December 2006; 664 pp.; In English; Original contains color and black and white illustrations

Report No.(s): RTO-AG-AVT-039; AC/323(AVT-039)TP/103; Copyright; Avail.: CASI: [C01](#), CD-ROM: [A99](#), Hardcopy

Combustion instabilities were discovered in the late 1930s as anomalies in firings of solid and liquid rockets. During World War II, experience gradually suggested that certain problems encountered in development and actual use of solid rockets were especially associated with pressure oscillations having relatively high frequencies ranging from a few hundred to several thousand Hertz. Associated problems were structural vibrations; greatly increased surface heat transfer rates; sometimes impaired performance; and, in extreme cases, failure of the combustion system and destruction of vehicles. By the 1950s, forms of combustion instabilities had been identified in all types of rockets, gas turbines, thrust augmentors and ramjets. The problem continues to the present time and will always be found in combustion systems, particularly those intended to provide high performance. Eliminating instabilities therefore becomes an important task in a development program. This study includes a wide span of material ranging from summaries of practical examples of combustion instabilities to the present status of the field; and results of a method for analysis of the general problem. Following a summary of practical problems in Chapter 1, a lengthy discussion is given in Chapter 2 of the best known mechanisms for oscillations in the various kinds of systems. Chapters 3 and 4 summarize a widely used general method of analyzing general unsteady motions in a combustion chamber, based on expansion in normal modes and spatial averaging of the equations of motion. The result is a formulation focused on the behavior of a set of coupled nonlinear oscillators. Chapter 5 is a summary of those parts of classical acoustics required to understand linear behavior and the elementary aspects of unsteady behavior in combustors. Chapters 6 and 7 are devoted to the theory of linear and nonlinear behavior respectively, with examples taken from experience with combustion systems. In Chapter 8 the subject of passive control is covered, giving a brief summary of experience, with several examples. The last section of the chapter describes work which has been done on some of the connections between the generation and shedding of large vortices and combustion in dump combustors. The book ends with Chapter 9, a brief coverage of active control applied to combustors. This subject has important potential applications not yet realized. It is particularly interesting because, in an elementary way, the framework of modern active control fits naturally into the scheme formulated here in Chapters 3 and 4. Eight Appendices to the book contain treatments of special topics referred to in the text.

Author

Combustion; Combustion Chambers; Nonlinear Systems; Propulsion System Configurations; Propulsion System Performance; Stability

20070012351 NASA Johnson Space Center, Houston, TX, USA

CFD Modeling Activities at the NASA Stennis Space Center

Allgood, Daniel; March 16, 2007; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NNS04AB67T

Report No.(s): SPPT-8076-0001; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012351>

A viewgraph presentation on NASA Stennis Space Center's Computational Fluid Dynamics (CFD) Modeling activities is shown. The topics include: 1) Overview of NASA Stennis Space Center; 2) Role of Computational Modeling at NASA-SSC; 3) Computational Modeling Tools and Resources; and 4) CFD Modeling Applications.

CASI

Computational Fluid Dynamics; Mathematical Models; Test Facilities; Liquid Propellant Rocket Engines; NASA Programs

20070012784 Lawrence Livermore National Lab., Livermore, CA USA

Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems

Clague, D.; Weisgraber, T.; Rockway, J.; McBride, K.; Feb. 2006; 13 pp.; In English

Report No.(s): DE2006-894770; UCRL-TR-218892; No Copyright; Avail.: National Technical Information Service (NTIS)

The focus of research effort described here is to develop novel simulation tools to address design and optimization needs

in the general class of problems that involve species and fluid (liquid and gas phases) transport through sieving media. This was primarily motivated by the heightened attention on Chem/Bio early detection systems, which among other needs, have a need for high efficiency filtration, collection and sample preparation systems. Hence, the said goal was to develop the computational analysis tools necessary to optimize these critical operations. This new capability is designed to characterize system efficiencies based on the details of the microstructure and environmental effects. To accomplish this, new lattice Boltzmann simulation capabilities were developed to include detailed microstructure descriptions, the relevant surface forces that mediate species capture and release, and temperature effects for both liquid and gas phase systems. While developing the capability, actual demonstration and model systems (and subsystems) of national and programmatic interest were targeted to demonstrate the capability. As a result, where possible, experimental verification of the computational capability was performed either directly using Digital Particle Image Velocimetry or published results.

NTIS

Computerized Simulation; Filtration; Fluid Flow; Optimization

20070012835 Georgia Inst. of Tech., Atlanta, GA USA

Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles

English, Brian A; Gadiraju, Priya; Rinehart, Christopher S; Glezer, Ari; Allen, Mark G; Jan 2006; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462961; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462961>

This paper presents batch-fabrication lamination approaches for the realization of large arrays of high-power, short-duration gas generator actuators (GGAs), and system implementation approaches for integration of these GGAs into a 40-mm diameter gun-launched projectile for projectile flight control and course correction. The GGAs are tested to determine the impulse delivered per GGA and the time required delivering the impulse. The arrays of GGAs are connected with control electronics and integrated into a 40-mm diameter projectile. The final result is a flight control system for a small-scale projectile; fabrication and characterization of the actuator component of this system will be presented here.

DTIC

Actuators; Flight Control; Gas Generators; Projectiles

20070012958 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint)

Montes, Daniel R; King, Paul I; Gruber, Mark R; Carter, Campbell D; Hsu, Kuang-Yu; Jul 2005; 24 pp.; In English

Contract(s)/Grant(s): Proj-3012

Report No.(s): AD-A463272; AFRL-PR-WP-TP-2006-247; AIAA-2005-3913; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463272>

An investigation into the non-reacting flow associated with the pylon-aided gaseous fuel injection upstream of a flame holding cavity is described. Characteristics of penetration and mixing were measured in a Mach 2 freestream environment. The downstream combustion cavity had an LID of 4.7 and an aft ramp angle of 22.5 degrees. A circular injection port was placed upstream of the cavity, and a series of three pylons (medium, tall, wide geometries) were in turn fitted just upstream of the port to examine changes in mixing and penetration of the fuel into the core airflow. The main goals of this experiment were to characterize the mixing ability of injected fuel with the core flow as it propagated downstream of the pylon and to analyze the effects, if any, of this mixing strategy on cavity flow and overall efficiency compared to a no pylon case. Visual measurements were obtained using Planar Laser-Induced Fluorescence (PLIF), and Mie scattering techniques. Of the three pylon geometries tested, the wide pylon (1.6 jet diameters wide, 4 diameters high) provided a 135% increase in penetration. All pylons lifted the fuel from the injection wall in the farfield (a flashback related issue), and all pylons demonstrated distinctive mixing characteristics when compared to the flat reference, although quantifying experiments on this subject are recommended.

DTIC

Cavity Flow; Flame Holders; Fuel Injection; Pylons; Supersonic Combustion; Supersonic Flow; Upstream

20070013155 Naval Surface Warfare Center, Bethesda, MD USA

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio

Donnelly, Martin J; Cutbirth, J M; Rogers, Ernest O; Jessup, Sturat D; Park, Joel T; Dec 2006; 79 pp.; In English

Report No.(s): AD-A463111; NSWCCD-50-TR-2006/031; No Copyright; Avail.: CASI: [A05](#), Hardcopy

An extensive experimental effort was undertaken to document the performance of a low-aspect ratio hydrofoil with trailing edge blowing across a Coanda surface in a large water tunnel facility. This facility was the William B. Morgan Large Cavitation Channel in Memphis, TN. The hydrofoil model with a taper ratio of 0.76 was mounted through a load balance. A reflection plane provided for an effective aspect ratio of 2. The dual-slot configuration allowed for an investigation of thrust vectoring, and also presented an unexpected opportunity to offset the negative impact of excessive turning of the wall jet onto the underside of the foil. This report serves to document the experimental details of that effort for future experiments and document the types of data collected for validation of computational fluid dynamics (CFD) codes. The performance of the selected hydrofoil section shape is documented with six-component load measurements and detailed laser Doppler velocimetry measurements (LDV) taken in the wake of the foil.

DTIC

Aspect Ratio; Coanda Effect; Hydraulic Test Tunnels; Hydrofoils; Low Aspect Ratio; Models; Thrust Vector Control; Wings

20070013321 Air Force Research Lab., Hanscom AFB, MA USA

Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma

Jasperse, John R; Basu, Bamandas; Lund, Eric J; Bouhram, Mehdi; Jan 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2311

Report No.(s): AD-A463595; AFRL-VS-HA-TR-2007-1012; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In this paper, a new fluid theory is given in the guiding-center and gyrotropic approximation which is derivable from the Vlasov-Maxwell equations. The theory includes the effect of wave-particle interactions for the weakly turbulent, weakly inhomogeneous, nonuniformly magnetized plasma, and it is applicable to a variety of space and laboratory plasmas. It is assumed that the turbulence is random and electrostatic, and that the velocity-space Fokker-Planck operator can be used to calculate the correlation functions that describe the wave-particle interactions. Conservation laws are derived that relate the low-order velocity moments of the particle distributions to the turbulence. The theory is based on the work of Hubbard [Proc. R. Soc. London, Ser. A 260,114 (1961)] and Ichimarti and Rosenbluth [Phys. Fluids 13, 2778 (1970)]. In the work presented here, the idea is proposed that the fluid equations can be solved (1) by using measurements of the turbulence to specify the electric-field fluctuations; and (2) by using measurements of the low-order velocity moments to specify the initial and boundary conditions.

DTIC

Fluid Dynamics; Gyrotropism; Magnetization; Plasmas (Physics); Turbulence

20070013501 Wray (James C.), McLean, VA, USA

Low-Drag Hydrodynamic Surfaces

Lang, T. G.; Lang, J. T.; 11 May 01; 27 pp.; In English

Contract(s)/Grant(s): DAR-DAAH01-96-C-R228; DAR-DAAH01-98-C-R115

Patent Info.: Filed 11 May 01; US-Patent-AppI-SN-09-852-616

Report No.(s): PB2007-101594; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The invention relates to the use of gas cavities to reduce frictional drag on underwater surfaces such as hydrofoils, struts, fins, rudders, keels, propeller blades, ship hulls, underwater bodies, and wetted surfaces in general. Each gas-filled cavity is formed behind a discontinuity in the surface that causes the water boundary layer to separate from the surface. Gas is ejected into a region behind the discontinuity to fill the cavity; the gas can be air. If a cavity is open to the atmosphere, then air can typically fill the cavity naturally without air ejection. Cavities can either be closed or open. A low drag hydrofoil may have a closed cavity on one side, and an open cavity on the other side. For closed cavities, the underlying surface can be shaped to minimize cavity closure drag. Various ways to generate cavities, change hydrodynamic forces, and duct gas internally on hydrofoils and struts with cavities are covered. Different designs of hydrofoil boats, hydrofoil ships and ship hulls that are amenable to drag reduction are presented.

NTIS

Drag Reduction; Hydrodynamics; Cavities; Underwater Vehicles; Gas Pockets

20070013540 Reinhart Noerner Van Deuren S.C., Milwaukee, WI, USA

Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux

Shedd, T. A.; Pautsch, A. G.; 2 Mar 05; 14 pp.; In English

Contract(s)/Grant(s): NSF 0134510

Patent Info.: Filed 2 Mar 05; US-Patent-Appl-SN-11-070-683

Report No.(s): PB2007-101681; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A cooling system and method that significantly improves spray evaporative cooling by using arrays of slot or plane sprays to create coverage of the entire heated surface to be cooled without allowing interaction between plumes that are spraying from the nozzles. The sprays are directed at an angle to the surface to take advantage of the high droplet momentum possessed by the spray to direct a flow of coolant fluid across the surface toward desired draining points, thereby enabling drainage regardless of the orientation of the unit.

NTIS

Drainage; Heat Flux; Sprayers; Cooling

20070013560 Rosenberg (Frank), Moraga, CA, USA

Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids

TeGrotenhius, W. E.; Stenkamp, V. S.; 1 Mar 05; 23 pp.; In English

Contract(s)/Grant(s): DE-AC0676RLO1830

Patent Info.: Filed 1 Mar 05; US-Patent-Appl-SN-11-070-628

Report No.(s): PB2007-105959; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods of separating fluids using capillary forces and/or improved conditions for are disclosed. The improved methods may include control of the ratio of gas and liquid Reynolds numbers relative to the Suratman number. Also disclosed are wick-containing, laminated devices that are capable of separating fluids.

NTIS

Laminates; Microchannels; Patent Applications

20070013680 Defence Science and Technology Organisation, Victoria, Australia

Smoothed Particle Hydrodynamics: Applications Within DSTO

Jones, D A; Belton, D; Oct 2006; 51 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463727; DSTO-TR-1922; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Smoothed Particle Hydrodynamics (SPH) is a computational technique for the numerical simulation of the equations of fluid dynamics without the use of an underlying numerical mesh. Although originally developed for use in astrophysical gas dynamics, SPH has recently been applied to many other areas of numerical fluid dynamics and materials modelling, several of which have particular relevance to defense problems of interest to the DSTO. In this report we review the basics of the method and then describe a simple two-dimensional SPH code for the simulation of incompressible fluid flow. The code is then applied to simple problems such as a dam break, the sloshing of water and wave breaking over ships. These examples illustrate both the capabilities of the technique and the relative ease with which the method can treat problems which have previously been considered difficult to solve using traditional methods such as finite difference, finite volume or finite element grid based methods. Further applications of the method are then reviewed, concentrating in particular on the utility of the technique in solid mechanics modelling, and then current applications of SPH within Maritime Platforms Division are described.

DTIC

Hydrodynamics; Computational Fluid Dynamics; Astrophysics; Particle Theory

20070013709 NASA Marshall Space Flight Center, Huntsville, AL, USA

A Magnetohydrodynamic Boost for Relativistic Jets

Mizuno, Yosuke; Hardee, Philip; Hartmann, Dieter; Nishikawa, Ken-Ichi; Zhang, Bing; Dec. 12, 2006; 2 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

We have performed relativistic magnetohydrodynamic simulations of the hydrodynamic boosting mechanism for relativistic jets explored by Aloy & Rezzolla (2006) using the RAISHIN code. Simulation results show that the presence of a magnetic field may change the properties of the shock interface between the tenuous, overpressured jet ($V_{\text{sub } j}(\text{sup } z)$) flowing tangentially to a dense external medium. Magnetic fields can lead to more efficient acceleration of the jet, in comparison to the pure-hydrodynamic case. A poloidal magnetic field ($B(\text{sup } z)$), tangent to the interface and parallel to the jet flow, produces both a stronger outward moving shock and inward moving rarefaction wave. This leads to a large velocity component normal to the interface in addition to acceleration tangent to the interface, and the jet is thus accelerated to a larger Lorentz factors than those obtained in the pure-hydrodynamic case. In contrast, a strong toroidal magnetic field ($B(\text{sup } y)$),

tangent to the interface but perpendicular to the jet flow, also leads to stronger acceleration tangent to the shock interface relative to the pure-hydrodynamic case, but to a lesser extent than found for the poloidal case due to the fact that the velocity component normal to the shock interface is now much smaller. Overall, the acceleration efficiency in the toroidal case is less than that of the poloidal case but both geometries still result in higher Lorentz factors than the pure-hydrodynamic case. Thus, the presence and relative orientation of a magnetic field in relativistic jets can have a significant influence on the hydrodynamic boost mechanism studied by Aloy & Rezzolla (2006).

Author

Jet Flow; Magnetohydrodynamics; Relativistic Effects; Simulation; Acceleration (Physics)

20070013714 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets

Daso, Endwell O.; Pritchett, Victor E.; Wang, Ten-See; Ota, Dale K.; Blankson, Isaiah M.; Auslender, Aaron H.; [2007]; 18 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

An active flow control concept using counterflowing jets to significantly modify the external flowfields and strongly weaken or disperse the shock-waves of supersonic and hypersonic vehicles to reduce the aerothermal loads and wave drag was investigated. Experiments were conducted in a trisonic blow-down wind-tunnel, complemented by pre-test computational fluid dynamics (CFD) analysis of a 2.6% scale model of Apollo capsule, with and without counterflowing jets, in Mach 3.48 and 4.0 freestreams, to assess the potential aerothermal and aerodynamic benefits of this concept. The model was instrumented with heat flux gauges, thermocouples and pressure taps, and employed five counterflowing jet nozzles (three sonic and other two supersonic with design Mach numbers of 2.44 and 2.94) and nozzle exit diameters ranging from 0.25 to 0.5 inch. Schlieren data show that at low jet flow rates of 0.05 and 0.1 lb(sub m)/sec, the interactions result in a long penetration mode (LPM) jet, while the short penetration mode (SPM) jet is observed at flow rates greater than 0.1 lb(sub m)/sec., consistent with the pre-test CFD predictions. For the LPM, the jet appears to be nearly fully-expanded, resulting in a very unsteady and oscillatory flow structure in which the bow shock becomes highly dispersed such that it is no longer discernable. Higher speed camera Schlieren data reveal the shock to be dispersed into striations of compression waves, which suddenly coalesce to a weaker bow shock with a larger standoff distance as the flow rate reached a critical value. The pronounced shock dispersion could significantly impact the aerodynamic performance (L/D) and heat flux reduction of spacecraft in atmospheric entry and re-entry, and could also attenuate the entropy layer in hypersonic blunt body flows. For heat transfer, the results show significant reduction in heat flux, even giving negative heat flux for some of the SPM interactions, indicating that the flow wetting the model is cooling, instead of heating the model, which could significantly impact the requirements and design of thermal protection system. These findings strongly suggest that the application of counterflowing jets as active flow control could have strong impact on supersonic and hypersonic vehicle design and performance.

Author

Shock Wave Interaction; Counterflow; Jet Flow; Computational Fluid Dynamics; Supersonic Flow; Free Flow; Dispersion

20070013735 NASA Marshall Space Flight Center, Huntsville, AL, USA

3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets

Mizuno, Yosuke; Hardee, Philip; Nishikawa, Ken-Ichi; November 14, 2006; 1 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

Numerical simulations of weakly magnetized and strongly magnetized relativistic jets embedded in a weakly magnetized and strongly magnetized stationary or weakly relativistic ($v = c/2$) sheath have been performed. A magnetic field parallel to the flow is used in these simulations performed by the new GRMHD numerical code RAISHIN used in its RMHD configuration. In the numerical simulations the Lorentz factor $\gamma = 2.5$ jet is precessed to break the initial equilibrium configuration. In the simulations sound speeds are less than or equal to $c/\text{the square root of } 3$ in the weakly magnetized simulations and less than or equal to $0.56 c$ in the strongly magnetized simulations. The Alfvén wave speed is less than or equal to $0.07 c$ in the weakly magnetized simulations and less than or equal to $0.56 c$ in the strongly magnetized simulations. The results of the numerical simulations are compared to theoretical predictions from a normal mode analysis of the linearized relativistic magnetohydrodynamic (RMHD) equations capable of describing a uniform axially magnetized cylindrical relativistic jet embedded in a uniform axially magnetized relativistically moving sheath. The theoretical dispersion relation allows investigation of effects associated with maximum possible sound speeds, Alfvén wave speeds near light speed and relativistic sheath speeds. The prediction of increased stability of the weakly magnetized system resulting from $c/2$ sheath

speeds and the stabilization of the strongly magnetized system resulting from $c/2$ sheath speeds is verified by the numerical simulation results.

Author

Magnetohydrodynamic Waves; Sheaths; Simulation; Three Dimensional Flow; Jet Flow

35

INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

20070011443 Defence Research and Development Canada, Ottawa, Ontario Canada

Noise Radar Technology Basics

Thayaparan, T; Wernik, C; Dec 2006; 51 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462896; DRDC-ONTARIO-TM-2006-266; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Recently, there has been considerable interest in noise radar over a wide spectrum of applications, such as through wall surveillance, detection, tracking, Doppler estimation, polarimetry, interferometry, ground-penetrating or subsurface profiling, synthetic aperture radar (SAR) imaging, inverse synthetic aperture radar (ISAR) imaging, foliage penetration imaging, etc. One of the major advantages of the noise radar is its inherent immunity from jamming, detection, and external interference. In this report, the basic theory of noise radar design is treated. The theory supports the use of noise waveforms for radar detection and imaging in such applications as covert military surveillance and reconnaissance. It is shown that by using wide-band noise waveforms, one can achieve high resolution and reduced ambiguities in range and Doppler estimations. Two coherent processing receivers, namely, the correlation receiver and the double spectral processing receiver of noise radar returns are described and their range estimation is presented. Mutual interference and low probability of interception (LPI) capabilities of noise radar are also evaluated. The simulation results show the usefulness of the noise radar technology to improve on conventional radars.

DTIC

Interferometry; White Noise; Imaging Radar; Synthetic Aperture Radar; Surveillance; Tracking (Position)

20070011685 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph

Haguenauer, Pierre; Serabyn, Eugene; Mennesson, Bertrand; Wallace, James K.; Gappinger, Robert O.; Troy, Mitchell; Bloemhof, Eric E.; Moore, Jim; Koresko, Chris D.; May 24, 2006; 10 pp.; In English; SPIE Astronomical Telescopes and Instrumentation, 24-31 May 2006, Orlando, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39816>

Direct detection of planets around nearby stars requires the development of high-contrast imaging techniques, because of their very different respective fluxes. We thus investigated the innovative coronagraphic approach based on the use of a four-quadrant phase mask (FQPM). Simulations showed that, combined with high-level wavefront correction on an unobscured off-axis section of a large telescope, this method allows high-contrast imaging very close to stars, with detection capability superior to that of a traditional coronagraph. A FQPM instrument was thus built to test the feasibility of near-neighbor observations with our new off-axis approach on a ground-based telescope. In June 2005, we deployed our instrument to the Palomar 200-inch telescope, using existing facilities as much as possible for rapid implementation. In these initial observations, using data processing techniques specific to FQPM coronagraphs, we reached extinction levels of the order of 200:1. Here we discuss our simulations and on-sky results obtained so far.

Author

Coronagraphs; Imaging Techniques; Quadrants; Detection; Astronomy

20070011737 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

2006 Interferometry Imaging Beauty Contest

Lawson, Peter R.; Cotton, William D.; Hummel, Christian A.; Ireland, Michael; Monnier, John D.; Thiebaut, Eric; Rengaswamy, Sridharan; Baron, Fabien; Young, John S.; Kraus, Stefan; Hoffman, Karl-Heinz; Weigelt, Gerd P.; Chesneau, Olivier; May 24, 2006; 12 pp.; In English; SPIE Astronomical Telescopes and Instrumentation, 24-31 May 2006, Orlando, FL, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39822>

We present a formal comparison of the performance of algorithms used for synthesis imaging with optical/infrared long-baseline interferometers. Five different algorithms are evaluated based on their performance with simulated test data. Each set of test data is formatted in the OI-FITS format. The data are calibrated power spectra and bispectra measured with an array intended to be typical of existing imaging interferometers. The strengths and limitations of each algorithm are discussed.

Author

Interferometers; Imaging Techniques; Algorithms; Infrared Radiation; Interferometry

20070012799 Naval Postgraduate School, Monterey, CA USA

A Performance Analysis of an Ad-hoc Ocean Sensor Network

Lim, Kwang Y; Dec 2006; 123 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462652; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA462652>

This thesis presents the simulation results and performance analysis of IEEE 802.15.4 in an oceanic environment. The 802.15.4 standard allows simple sensors and actuators to co-exist in a single wireless platform. The simulation is performed using Network Simulator, version 2 (NS2) which is an open-source network simulator tool. NS2 is an event driven network simulator developed at UC Berkeley that simulates a variety of networks. Leveraging on the capabilities of NS2, the performance of the IEEE 802.15.4 protocol has been studied based on variations in node density, mobility as well as loading conditions. The mobility model selected for the simulation has considered the ocean effects on the mobile nodes, in particular the surface current. However, the available mobility models (Random Waypoint, Gauss-Markov, Manhattan Grid and Reference Point Group) do not represent the real life mobility in an oceanic environment scenario. As a result, actual data of surface measurement in the Monterey bay area is used to generate the node movements. The results from this analysis provide insights into the performance of IEEE 802.15.4 and its suitability for operating in an oceanic environment.

DTIC

Detectors; Marine Environments; Networks; Oceans; Reliability Analysis; Simulation; Wireless Communication

20070012803 Naval Postgraduate School, Monterey, CA USA

Joint Demodulation of Low-Entropy Narrowband Cochannel Signals

Meehan, Timothy J; Dec 2006; 206 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462659; No Copyright; Avail.: CASI: A10, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462659>

Reception of one or more signals, overlapping in frequency and time with the desired signal, is commonly called cochannel interference. Joint detection is the optimal minimum probability of error decision rule for cochannel interference. This dissertation investigates the optimum approach and a number of suboptimum approaches to joint detection when a priori information based in fields, or sets of transmitted symbols, is available. In the general case the solution presents itself as a time-varying estimation problem that may be efficiently solved with a modified Bahl, Cocke, Jelinek and Raviv (BCJR) algorithm. The low-entropy properties of a particular signal of interest, the Automatic Identification System (AIS), are presented. Prediction methods are developed for this signal to be used as a priori information for a joint field-based maximum a posteriori (MAP) detector. Advanced joint detection techniques to mitigate cochannel interference are found to have superior bit error rate (BER) performance than can be obtained compared to traditional methods.

DTIC

Demodulation; Entropy; Narrowband; Signal Processing

20070012815 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG)

Rowe, Gary W; Jan 2007; 53 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-8-CO-160-UXO-016

Report No.(s): AD-A462910; ATC-9326; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462910>

This report documents the efforts of Concurrent Technologies Corporation (CTC) to detect and discriminate inert unexploded ordnance (UXO) using a FEREX DLG-Global Positioning System (GPS) magnetometer (MAG). Testing was conducted at ATC, Standardized Shallow Water UXO Technology Demonstration Site. A description of the tested system and

an estimate of survey costs along with the analysis of the system performance are provided.

DTIC

Evaluation; Global Positioning System; Magnetometers; Ordnance; Scoring; Shallow Water; System Effectiveness

20070012821 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA
Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII)

Rowe, Gary W; Jan 2007; 51 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-8-CO-160-UXO-016

Report No.(s): AD-A462933; ATC-9329; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462933>

This report documents the efforts of NAEVA/XTECH to detect and discriminate inert unexploded ordnance (UXO) using an EM61 MKII. Testing was conducted at ATC, Standardized Shallow Water UXO Technology Demonstration Site. A description of the tested system and an estimate of survey costs along with the analysis of the system performance are provided.

DTIC

Evaluation; Ordnance; Scoring; Shallow Water; System Effectiveness

20070012855 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics)

Berkman, H T; van Putten, F M; Fritz, P; Sep 2006; 38 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462993; TNO-DV-2006-A336; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462993>

In this project the benefits of adaptive optics for military applications are assessed. Adaptive optics can be used in electro-optical camera systems and it can be used in laser systems such as directed infrared counter measure systems. In a WEAG project JP8.11 on Precision Laser Beam Steering the benefits of adaptive optics for long range target identification and DIRCM have been evaluated. The findings of the study group are reported in TNO report FEL-04- AI 02. In this project we have studied some of the questions raised in JP8.11 in more detail. The first question is for which optical detection systems adaptive optics can bring some benefits. It was concluded that only for lenses with very large focal numbers and therefore very small field of view adaptive optics can be beneficial. This is caused by the very small atmospheric 'iso-planatic' patch which is typical of the order of 1 mrad. We have also studied the influence of atmospheric or plume turbulence on the jam modulation pattern. We have found that plume turbulence levels can severely distort the jam pattern, thus increasing the break-lock time or making the jamming ineffective. This aspect will be further studied in an EDA project.

DTIC

Adaptive Optics; Electro-Optical Photography; Military Technology; Optical Countermeasures

20070012954 Georgia Inst. of Tech., Atlanta, GA USA

High Temperature Characterization of Ceramic Pressure Sensors

Fonseca, Michael A; English, Jennifer M; Von Arx, Martin; Allen, Mark G; Jan 2001; 5 pp.; In English

Contract(s)/Grant(s): DAAH04-96-1-0008

Report No.(s): AD-A463252; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463252>

This work reports functional wireless ceramic micromachined pressure sensors operating at 450 C, with demonstrated materials and readout capability indicating potential extension to temperatures in excess of 600 C. These devices are self-packaged and are operating in actual high-temperature environments, not in simulated hot-plate testbeds. A resonant readout technique is employed, in which a planar spiral inductor and a pressure-sensitive capacitor form a passive LC circuit, the resonance frequency of which is sensitive to the external applied pressure, and which can be read out using a simple external loop antenna.

DTIC

Ceramics; Detectors; High Temperature; Pressure; Pressure Sensors

20070013153 Texas Univ., Austin, TX USA

Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas

Ling, Hao; Jan 31, 2007; 94 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-1-0722

Report No.(s): AD-A462984; 4; No Copyright; Avail.: CASI: [A05](#), Hardcopy

This report summarizes the scientific progress on the research grant 'Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas' during the period 1 May 2005 - 31 December 2006. Research on the design and implementation of low-complexity radar sensors capable of detection and tracking of humans in high-clutter environments is presented.

DTIC

Cities; Detection; Low Cost; Personnel; Radar Detection; Radar Equipment; Tracking (Position)

20070013218 Defense Science Board, Washington, DC USA

Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report

Feb 2007; 122 pp.; In English

Report No.(s): AD-A463361; No Copyright; Avail.: CASI: [A06](#), Hardcopy

For the foreseeable future, U.S. military forces will be called upon to perform a wide range of missions. These include major combat, counter insurgency, stability and reconstruction, countering weapons of mass destruction, homeland defense, and disaster relief. These varied missions present different challenges calling for highly adaptive military forces. One common feature of these missions is the increased responsibility placed on junior leaders and the small teams they lead. This report of the Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors identifies a set of four operational capabilities and their enabling technologies that can support the range of future military missions. In identifying these capabilities, the report defined technology broadly, to include tools enabled by the social sciences as well as the physical and life sciences. A key enabler to all of these capabilities is the availability of ubiquitous, secure, reliable, rapid connectivity among all the sources and users of information. This report recommends ways that DOD can (1) reestablish a tighter integration between DOD's user and technology communities, (2) enrich its capacity to recognize and exploit technology opportunities, (3) establish robust processes to insert new capabilities into ongoing operations to meet an expected long term need, and (4) cut in half the time it nominally takes to field major systems. The report also identifies steps to broaden and deepen DOD's in-house technical expertise, search globally for technologies that may become important to DOD and/or its adversaries, provide budget flexibility, lower barriers to commercial firms working with DOD, and revitalize internal research and development investments in the defense industry.

DTIC

Forecasting; Management Planning; Planning; Summer; Technological Forecasting

20070013561 Defence Research and Development Canada, Ottawa, Ontario Canada

A Simulation Study of Multi-Channel RADARSAT-2 GMTI

Chiu, S; Nov 2006; 77 pp.; In English; In English; In French; Original contains color illustrations

Report No.(s): AD-A462981; DRDC-OTTAWA-TM-2006-209; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462981>

Accurate ground moving target indication (GMTI) and target parameter estimation can be achieved only after sufficient suppression of interfering stationary clutter, particularly for space-based SARs with typically small exo-clutter regions. In its simplest form, this is accomplished using two radar receiver channels, such as the dual receive antenna mode of RADARSAT-2's Moving Object Detection EXperiment (MODEX). In this mode of operation, the full antenna is broken up into two sub-apertures with two parallel receivers to create two independent phase centers. It is well known, however, that a two-aperture approach to GMTI is sub-optimum and that target parameter estimation is often compromised by clutter interference or poor signal-to-clutter ratios. Two degrees-of-freedom are simply not enough to simultaneously suppress the clutter and to accurately estimate the target's properties, such as velocity and location. The investigation, described in this Technical Memorandum, explores several concepts of increasing the spatial diversity for RADARSAT-2, which allows the two-channel SAR system to operate like a three or four channel radar. Owing to the very flexible programming capabilities of the RADARSAT-2 antenna, this can either be accomplished by the toggling of the transmitter between subsequent pulses or via clever transmitter/receiver excitation schemes. A trade-off analysis between number of channels, phase center separations, and PRF limitations is presented for a system based on RADARSAT-2 MODEX parameters.

DTIC

Apertures; RADARSAT; Simulation; Synthetic Aperture Radar

20070013563 Defence Research and Development Canada, Ottawa, Ontario Canada

CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC

English, Ryan A; Liu, Chen; Schlingmeier, David; Vachon, Paris W; Oct 2006; 138 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462997; DRDC-TM-2006-184; No Copyright; Avail.: CASI: [A07](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462997>

This memorandum addresses DRDC Ottawa design, experimentation, and data collection components in the CoCoNaut airborne Synthetic Aperture Radar (SAR) trial conducted off Vancouver Island, BC, 15 September - 4 October, 2004, in conjunction with a Canadian Space Agency (CSA) deployment. Several controlled ships (commercial, military and Coast Guard) and land-based vehicles were instrumented as targets for polarimetric SAR (PoISAR) and Moving Target Indication (MTI) data acquisitions. C-band SAR imagery was collected using the sensor on Environment Canada's CV-580 platform, with a radar calibration site established at the Tofino Airport (CYAZ). Ground-truthing for targets of opportunity was highly desired and supporting efforts made to identify them through contact tracking and photography, employing CP-140 maritime patrol aircraft, aerial creel survey flights, Marine Communications and Traffic Service, contracted aerial photography flights, and the Recognized Maritime Picture (RMP). Twenty lines of PoISAR data were collected, each covering a wide swath containing maritime targets of opportunity and all include the calibration site at CYAZ. Eight also contain a controlled CCG vessel exhibiting various speeds, incidence angles and aspect angles. Thirty-two lines of MTI data were collected. Sixteen contain controlled maritime targets, seven contain controlled land-based vehicles, four (one maritime, three land) contain only targets of opportunity, and five are calibration lines. Three further flights of PoISAR imagery were collected by CSA, each including a calibration pass over CYAZ. A representative analysis of a maritime target in PoISAR imagery is provided.

DTIC

Collection; Moving Target Indicators; Polarimetry; Signatures; Synthetic Aperture Radar

36

LASERS AND MASERS

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also *76 Solid-State Physics*.

20070012332 NASA Langley Research Center, Hampton, VA, USA

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements

Marcia, Joel; DeYoung, Russell J.; March 2007; 21 pp.; In English

Contract(s)/Grant(s): WBS 698671.01.07.09

Report No.(s): NASA/TM-2007-214544; L-19321; Copyright; Avail.: CASI: [A03](#), Hardcopy

A small compact ozone differential absorption lidar capable of being deployed on a small aircraft or unpiloted atmospheric vehicle (UAV) has been tested. The Ce:LiCAF tunable UV laser is pumped by a quadrupled Nd:YLF laser. Test results on the laser transmitter demonstrated 1.4 W in the IR and 240 mW in the green at 1000 Hz. The receiver consists of three photon-counting channels, which are a far field PMT, a near field UV PMT, and a green PMT. Each channel was tested for their saturation characteristics.

Author

Optical Radar; Differential Absorption Lidar; Ozone; Tunable Lasers; Ultraviolet Lasers; Atmospheric Composition

20070012360 NASA Glenn Research Center, Cleveland, OH, USA

Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers

Mueller, Carl H.; Rojas, Roberto A.; Nessel, James A.; Miranda, Felix A.; [2007]; 16 pp.; In English; Great Lakes Photonics Symposium Society of Photonics and Instrumentation Engineers (SPIE), 12-16 Jun. 2006, Dayton, OH, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 604746.01.98.03.14; Copyright; Avail.: CASI: [A03](#), Hardcopy

High data rate communication links are needed to meet the needs of NASA as well as other organizations to develop space-based optical communication systems. These systems must be robust to high radiation environments, reliable, and operate over a wide temperature range. Highly desirable features include beam steering capability, reconfigurability, low power consumption, and small aperture size. Optical communication links, using coupled vertical cavity surface emitting laser radiating elements are promising candidates for the transmit portion of these communication links. In this talk we describe a mission scenario, and how the antenna requirements are derived from the mission needs. We describe a potential architecture for this type of antenna, and outline the advantages and drawbacks of this approach relative to competing technologies. The technology we are proposing used coupled arrays of 1550 nm vertical cavity surface emitting lasers for transmission. The feasibility of coupling these arrays together, to form coherent high-power beams that can be modulated at data rates exceeding 1 Gbps, will be explored. We will propose an architecture that enables electronic beam steering, thus mitigating the need for ancillary acquisition, tracking and beam pointing equipment such as needed for current optical communication systems. The

beam-steering capability we are proposing also opens the possibility of using this technology for inter-satellite communication links, and satellite-to-surface links.

Author

Antenna Arrays; Communication Networks; Optical Communication; Phased Arrays; Coupled Modes; Oscillators; Surface Emitting Lasers; Laser Cavities

20070012802 Naval Postgraduate School, Monterey, CA USA

Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera

Lowe, Michele; Dec 2006; 63 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462655; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462655>

The employment of terahertz (THz) technology for applications including Improvised Explosive Device (IED) and concealed weapons detection is a rapidly growing field of research. Additionally, THz waves do not pose a health hazard as do x-rays and as such can be used for the imaging and detection of certain cancers. To date, however, most detectors are highly sophisticated, bulky systems which require extensive cooling in order to provide a signal-to-noise (SNR) ratio high enough for detection. A detection system that is simple in operation and uncooled is highly desirable and is the focus of this research. In this thesis, operation of a 3.4 THz quantum cascade laser (QCL) was successfully achieved using a closed cycle cryostat and nanosecond pulse generator with impedance matching circuitry. The laser beam was imaged in real time using an uncooled microbolometer infrared camera typically used in far-infrared wavelength band (8-12 mm). The preliminary findings offer potential for development of a compact THz imaging system for applications involving concealed object detection.

DTIC

Bolometers; Cameras; Explosives Detection; Imaging Techniques; Laser Beams; Mine Detectors; Quantum Cascade Lasers

20070012822 Colorado Univ., Boulder, CO USA

Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrastable Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy

Ye,; Jul 31, 2006; 4 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0415; Proj-2301

Report No.(s): AD-A462934; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462934>

We have been very productive during the entire funding period. We have reached all three goals listed in the project title well beyond the initial expectations and have published a number of high profile papers documenting these successes. We have given numerous invited talks on the research supported by AFOSR. We have achieved direct stabilization of a femtosecond-laser-based optical frequency comb by a high-finesse passive optical cavity. We carried out detailed comparison of two distinct stabilization schemes and the result leads to new understanding of the optimum conditions for cavity stabilization as well as on approaches to overcome limitations on the ability to transfer the frequency stability of the cavity to the microwave domain. The stability of the frequency comb is explored in both the optical and the radio frequency domain. With an independent, stable CW laser, we have verified that the line width and stability of the wide-bandwidth optical comb components, respectively, reach below 300 Hz and 5×10^{-14} at 1 s averaging time, both limited by the reference CW laser.

DTIC

Bandwidth; Broadband; Cavities; Frequencies; Laser Spectroscopy; Lasers; Optical Resonators; Stability

20070012831 Ben Gurion Univ. of the Negev, Beersheva, Israel

Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers

Barmashenko, Boris; Rosenwaks, Zamik; Rybalkin, Victor; Katz, Arje; Apr 26, 2005; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-04-1-3031; FA8655-03-1-3055

Report No.(s): AD-A462954; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462954>

Due to the success in raising the chemical efficiency of our supersonic COIL to a new record (~ 40%), approaching the theoretical limit for this efficiency, we have devoted most of our efforts during the reported period to studying the optimal conditions for lasing and detailed diagnostic study of the O₂(1 delta) yield and spatial distributions of the gain and temperature in the resonator. These diagnostic studies are a prerequisite for the measurements of the I₂ dissociation fraction which are

underway. The following projects have been carried out during the reported period: 1. Measurements of the lasing power for new supersonic nozzles with different injection location along the flow and for different throat heights and achievement of 40% chemical efficiency. 2. Measurements of the gain and temperature for different nozzles with supersonic mixing. 3. Measurements of the O₂(1 delta) yield and chlorine utilization in the singlet oxygen generator. 4. Design, manufacturing and testing of a new optical system for measurements of [I₂] using 488 nm probe beam from a blue laser.

DTIC

Chemical Lasers; Chemical Oxygen-Iodine Lasers; Dissociation; Iodine

20070013238 Air War Coll., Maxwell AFB, AL USA

Directed Energy Weapons on the Battlefield: A New Vision for 2025

Geiss, Il, John P; Apr 2003; 71 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463429; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Several nations are engaging in development and production of directed energy weapons. Recent scientific advances now enable the production of lethal lasers and high-powered microwaves. The current growth and development in this emerging area strongly suggests that directed energy weapons of lethal power will reach the battlefield before 2010. Since proliferation of lower power laser weapons has already happened, it is likely that proliferation of high power or high energy weapons will occur as well. This paper expands on this development and posits potential impacts on a plausible future battlefield, developed in part from the Alternate Futures of AF 2025, where all comers deploy lethal directed energy technologies. From these impacts, which span doctrine, organization, force structure, and systems design, this paper recommends changes to better posture the USA for this potential future.

DTIC

Lethality; Weapon Systems

20070013239 Air War Coll., Maxwell AFB, AL USA

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy

Belland, Kris M; Sep 2003; 64 pp.; In English

Report No.(s): AD-A463434; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Using cutting-edge technology to create a human factors advantage in military operations will contribute to success on the battlefield of the future whether below the surface, on the surface, in the air, or in space. Human factors system selection in the past has appeared to be arbitrary and intermittent, with no unifying vision and apparently little or no coordination between the military services. Mature, timely applied technology will reduce risk and enhance combat capability. By decreasing mishaps during training and combat, there will be a reduced number of lost lives of highly trained and costly aircrew, while preserving training and combat assets both manned aircraft and unmanned air vehicles. A concomitant increase in survivability through better understanding of human factors technology will ultimately give the modern aviation warrior a tactical edge throughout the full spectrum of combat and provide secondary benefits to the civilian aviation sector as well. This paper explains currently available and emerging aviation human factors technological advances in today's military aviation weapons systems and recommends a vision and direction for the most promising of these emerging aviation human factors-related technological advances.

DTIC

Augmentation; Cutting; Flight Crews; Human Factors Engineering; Human Performance; Lasers; Weapon Systems

20070013273 New Mexico Univ., Albuquerque, NM USA

High Power Mid Wave Infrared Semiconductor Lasers

Krishna, Sanjay; Dawson, Ralph; Jun 15, 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0437

Report No.(s): AD-A463489; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This project identifies key challenges for the development of high-power electrically injected MWIR laser arrays using 111-V antimonide based materials. In this approach, InGaSb quantum wells are grown on metamorphic layers on a GaSb or GaAs substrate. Doping of these layers is extremely challenging. We have obtained activation energies for Te-doped and Be-doped InAlSb. Using a novel interlayer doping schemes, we have been able to fabricate high quality PIN diodes. We have also filed a provisional patent on semiconductor conducting layers. The license for this patent is presently being negotiated by the University tech transfer office with a small business firm in new mexico. We have also demonstrated room temperature

photoluminescence up to 3 gm from InGaSb quantum wells grown on GaAs substrate. Using this approach we have fabricated optically pumped vertical cavity surface emitting lasers.

DTIC

Infrared Lasers; Infrared Radiation; Laser Cavities; Optical Pumping; Photoluminescence; Semiconductor Lasers; Surface Emitting Lasers

20070013291 California Univ., Berkeley, CA USA

Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics

Leone, Stephen R; Dec 31, 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0083

Report No.(s): AD-A463525; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This research program explored time-resolved dynamics of molecular systems by femtosecond photoelectron spectroscopy using high order harmonics. Ultrafast soft x-ray laser pump/probe studies revealed changes in binding relations and atomic core level shifts in the molecules during chemical rearrangements by detecting the changes in photoelectron energies as a function of internuclear separation in dissociative states in real time. Harmonic pulses with photon energies up to 100 eV and femtosecond time resolution were produced with excellent efficiency and pulse-to-pulse stability. Valence and core photoelectron spectra were obtained on neutral atoms and molecules. Phase manipulation of high order harmonics was achieved. Photoelectron spectra and photoionization mass spectra of gas phase ionic liquids were obtained. Two color excitation spectra of bromine molecules were investigated, as well as Rydberg wave packet photoelectron angular distributions. Pump/probe experiments on the photodissociation of metal carbonyls, halogens, and aluminum halides were also under investigation.

DTIC

Harmonics; Molecular Dynamics; X Ray Lasers; X Rays

20070013311 Stanford Univ., Stanford, CA USA

Emissions Control in Swirl-Stabilized Combustors

Hanson, Ronald K; Dec 2006; 39 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0837; OSP-03102

Report No.(s): AD-A463573; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Stanford University portion of this collaborative project has four major goals: 1) develop real-time tunable-diode-laser (TDL)-based sensors for combustion control, 2) demonstrate the use of these sensors to measure temperature in liquid-fueled swirl-stabilized flames at the University of Cincinnati, 3) fabricate a swirl-stabilized gas and liquid fuel burner with optical access to enable diagnostic development that mimics the atmospheric pressure performance of the University of Cincinnati facility, and 4) demonstrate the use of the TDL sensor for combustion control in this burner. Early in the project, we designed, fabricated, and tested a first generation TDL temperature sensor using water vapor absorption near 1.8 micrometers. After testing the sensor in well-controlled heated-cell and in stable laminar flames at Stanford University, this first generation temperature sensor was used for measurements a practical swirl-stabilized burner at the University of Cincinnati. The plus or minus 20K accuracy at 500Hz illustrated the potential for TDL laser temperature sensing for combustion control. The time-resolved (500Hz) measurements of gas temperature obtained were the first use of TDL temperature sensing in a liquid-fueled combustor. These measurements also demonstrated the ability to monitor temperature fluctuations in a forced flame and illustrated the potential to identify% of combustion instabilities using a fast Fourier transform (FFT) of time-resolved temperature measurements.

DTIC

Atmospheric Pressure; Combustion Chambers; Fast Fourier Transformations; Fuels; Liquid Fuels; Semiconductor Lasers

37

MECHANICAL ENGINEERING

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

20070011512 Law Office and Kenneth W. Float, Braselton, GA, USA

High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication

Ayazi, F.; Zaman, M. F.; 12 Jan 05; 14 pp.; In English

Contract(s)/Grant(s): ECS-0301900

Patent Info.: Filed 12 Jan 05; US-Patent-Appl-SN-11-034 145

Report No.(s): PB2007-103275; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A microstructure comprising an in-plane solid-mass electrically conductive tuning fork gyroscope and fabrication methods. The gyroscope is formed using substrate material having lower and upper layers sandwiching a sacrificial insulating layer. An exemplary gyroscope comprises a low-resistivity single-crystal silicon substrate having a lower support layer and an upper flexible support layer. Two opposed proof masses that are separated from the lower support layer lie in and are supported by the upper flexible support layer. Two drive electrodes are disposed adjacent to the proof masses and are insulatably supported by the lower support layer and are separated from the upper flexible support layer. Sense, balance and tuning electrodes are disposed adjacent to the proof masses and are insulatably supported by the lower support layer and are separated from the upper flexible support layer. The operational mode shapes are in-plane with the substrate surface and only measures angular motion that are orthogonal to the plane of the substrate. The microstructure flexural design enables the sense and the drive resonant frequencies to occur in close proximity of one another. This enables matched-mode operation of the device thereby ensuring maximum sensitivity.

NTIS

Fabrication; Forks; Gyroscopes; High Resolution; Tuning

20070011580 Lawrence Livermore National Lab., Livermore, CA USA

Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology

Hessel, R. P.; Aceves, S. M.; Flowers, D. L.; Mar. 13, 2006; 8 pp.; In English

Report No.(s): DE2006-894001; UCRL-CONF-219731; No Copyright; Avail.: Department of Energy Information Bridge

The growing interest in gaseous fuels (hydrogen and natural gas) for internal combustion engines calls for the development of computer models for simulation of gaseous fuel injection, air entrainment and the ensuing combustion. This paper introduces a new method for modeling the injection and air entrainment processes for gaseous fuels. The model uses a gaseous sphere injection methodology, similar to liquid droplet in injection techniques used for liquid fuel injection. In this paper, the model concept is introduced and model results are compared with correctly- and under-expanded experimental data.

NTIS

Fuel Injection; Gas Injection; Gaseous Fuels; Spheres

20070011586 Mack Trucks, Inc., Hagerstown, MD, USA, Southwest Research Inst., San Antonio, TX USA, Sturman Industries, Woodland Park, CO, USA

US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006

Tai, C.; Reppert, T.; Chiu, J.; Christensen, L.; Knoll, K.; Oct. 2006; 49 pp.; In English

Report No.(s): DE2006-894101; No Copyright; Avail.: National Technical Information Service (NTIS)

The report discusses a project to develop a low-emissions natural gas engine with exhaust gas recirculation (EGR) and a three-way catalyst (TWC).

NTIS

Internal Combustion Engines; Natural Gas; Prototypes

20070011587 Cummins Westport, Vancouver, British Columbia, Canada

Development of a Cummins Westport SI-EGR Natural Gas Engine at 0.2 g/bhp-hr. February 2, 2005-July 31, 2006

Kamel, M.; Oct. 2006; 21 pp.; In English

Report No.(s): DE2006-894102; No Copyright; Avail.: National Technical Information Service (NTIS)

Discusses development and demonstration of advanced vehicle technologies for controlling exhaust emissions in a medium-duty natural gas engine to meet 2010 federal standards.

NTIS

Exhaust Emission; Internal Combustion Engines; Natural Gas

20070012414 NASA Dryden Flight Research Center, Edwards, CA, USA, Saint Martin's Coll., Lacey, WA, USA

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C

Abdelmessih, A. N.; Horn, T.; August 13, 2006; 13 pp.; In English; 13th International Heat Transfer Conference, 13-18 Aug.

2006, Sydney, Australia; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#),

Hardcopy

Initial transient thermal models have been developed to simulate a heat flux gage calibration process capable of generating high heat flux levels of interest to reciprocating and gas turbine engine industries as well as the aerospace industry. These transient models are based on existing, experimentally validated, steady state models of the cylindrical blackbody calibration system. The steady state models were modified to include insertion of a heat flux gage into the hot zone of the calibration system and time varying electrical current passing through the resistance heated blackbody. Heat fluxes computed using the initial transient models were compared to experimental measurements. The calculated and measured transient heat fluxes were within 5% indicating that the major physical phenomena in the transient calibration had been captured by the models. The predicted and measured transient heat fluxes were also compared at two different gage insertion depths. These results indicated that there is an optimum insertion position which maximizes heat flux and minimizes cavity disturbance.

Author

Cylindrical Bodies; Heat Flux; Black Body Radiation; Cavities; Measuring Instruments; Characterization; Surges; Insertion; Numerical Analysis

20070012860 Army Defense Ammunition Center, McAlester, OK USA

Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures

Jan 2007; 31 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463003; DAC/VED-06-04C; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463003>

The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMCA-DEV), was tasked by the Logistics Research and Development Activity (AMSRD-AAR-AIL-F), Picatinny Arsenal, NJ to conduct transportability retesting on the Joint Modular Intermodal Platform (JMIP) manufactured by SEA BOX Inc, East Riverton, NJ. The testing was conducted in accordance with TP-94-01, Revision 2, June 2004, 'Transportability Testing Procedures.' The change on the JMIP from the unit previously tested (Report 06-04 A3) was that the pin and locking mechanism that supported the A-frame in the container transport position was redesigned. The objective of the testing was to evaluate the change in the design of the pin and locking mechanism that secured the A-frame in the container transport position when transportability tested in accordance with TP-94-01, Revision 2, June 2004. The following observations resulted from the testing of JMIP: 1. Movement of the adjustment bolt on the cams did occur during the testing. The movement of the cam locking bolt was not significant enough to cause excessive movement of the JMIP. Future designs of the cam locking devices should prevent the bolts from moving in or out. 2. The pin and locking mechanism that held the A-frame in the container transport position completed the testing without failure or damage. The JMIP, with interface frames, as currently designed, is adequate to be used to transport the Navy JMIP containers with ammunition, on/off road, in an intermodal container during the LMUA. The maximum gross weight (platform and payload weight) is not to exceed 15,000 pounds during the LMUA.

DTIC

Evaluation; Fasteners; Impact Tests; Locking; Pins; Roads; System Effectiveness

20070013475 Lawrence Livermore National Lab., Livermore, CA USA

Fast Prediction of HCCI Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code

Aceves, S. M.; Flowers, D. L.; Chen, J. Y.; Babaimopoulos, A.; Aug. 2006; 11 pp.; In English

Report No.(s): DE2006-894749; UCRL-CONF-224052; No Copyright; Avail.: National Technical Information Service (NTIS)

We have developed an artificial neural network (ANN) based combustion model and have integrated it into a fluid mechanics code (KIVA3V) to produce a new analysis tool (titled KIVA3V-ANN) that can yield accurate HCCI predictions at very low computational cost. The neural network predicts ignition delay as a function of operating parameters (temperature, pressure, equivalence ratio and residual gas fraction). KIVA3V-ANN keeps track of the time history of the ignition delay during the engine cycle to evaluate the ignition integral and predict ignition for each computational cell. After a cell ignites, chemistry becomes active, and a two-step chemical kinetic mechanism predicts composition and heat generation in the ignited cells.

NTIS

Combustion; Fluid Mechanics; Neural Nets

20070013546 NASA Johnson Space Center, Houston, TX, USA

Pyrovalve Blowby Tests

Saulsberry, Regor; Keddy, Christopher P.; Julien, Howard L.; November 26, 2003; 4 pp.; In English
Report No.(s): WSTF # 03-37670; No Copyright; Avail.: CASI: [A01](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20070013546>

The NASA White Sands Test Facility (WSTF) was requested to perform pyrovalve blowby tests in support of the Mars Observer Propulsion and Corrective Actions Test Program. Fifty-three tests were conducted in an attempt to characterize the blowby of commercial pyrovalves. Those pyrovalves used on NASA spacecraft are well represented, and the test data reported provide a basis for evaluating the performance of similar valves in other propulsion systems. The three test series conducted are subsequently described. All testing was done in the same test facility, with periodic changes that enhanced the test methodology.

Derived from text

Valves; Pyrotechnics; Leakage; Test Facilities; Systems Engineering

38

QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

20070011688 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Ultra Reliability Workshop Introduction

Shapiro, Andrew A.; June 21, 2006; 13 pp.; In English; Ultra Reliability Workshop, 20-21 Jun. 2006, Huntsville, AL, USA; Original contains color illustrations; Copyright; Avail.: Other Sources
ONLINE: <http://hdl.handle.net/2014/39814>

This plan is the accumulation of substantial work by a large number of individuals. The Ultra-Reliability team consists of representatives from each center who have agreed to champion the program and be the focal point for their center. A number of individuals from NASA, government agencies (including the military), universities, industry and non-governmental organizations also contributed significantly to this effort. Most of their names may be found on the Ultra-Reliability PBMA website.

Derived from text

Reliability; Organizations; Industries

20070012399 NASA Johnson Space Center, Houston, TX, USA

Implementation of Programmatic Quality and the Impact on Safety

Huls, Dale Thomas; Meehan, Kevin; May 25, 2005; 2 pp.; In English; International Association for the Advancement of Space Safety (IAASS) Conference, 25-27 Oct. 2005, Nice, France; No Copyright; Avail.: Other Sources; Abstract Only

The purpose of this paper is to discuss the implementation of a programmatic quality assurance discipline within the International Space Station Program and the resulting impact on safety. NASA culture has continued to stress safety at the expense of quality when both are extremely important and both can equally influence the success or failure of a Program or Mission. Although safety was heavily criticized in the media after Col-imbias, strong case can be made that it was the failure of quality processes and quality assurance in all processes that eventually led to the Columbia accident. Consequently, it is possible to have good quality processes without safety, but it is impossible to have good safety processes without quality. The ISS Program quality assurance function was analyzed as representative of the long-term manned missions that are consistent with the President's Vision for Space Exploration. Background topics are as follows: The quality assurance organizational structure within the ISS Program and the interrelationships between various internal and external organizations. ISS Program quality roles and responsibilities with respect to internal Program Offices and other external organizations such as the Shuttle Program, JSC Directorates, NASA Headquarters, NASA Contractors, other NASA Centers, and International Partner/participants will be addressed. A detailed analysis of implemented quality assurance responsibilities and functions with respect to NASA Headquarters, the JSC S&MA Directorate, and the ISS Program will be presented. Discussions topics are as follows: A comparison of quality and safety resources in terms of staffing, training, experience, and certifications. A benchmark assessment of the lessons learned from the Columbia Accident Investigation (CAB) Report (and follow-up reports and assessments), NASA Benchmarking, and traditional quality assurance activities against ISS quality procedures and practices. The lack of a coherent operational and sustaining quality assurance strategy for long-term manned space flight. An analysis of the ISS waiver processes and the Problem Reporting and Corrective Action (PRACA) process implemented as quality

functions. Impact of current ISS Program procedures and practices with regards to operational safety and risk A discussion regarding a 'defense-in-depth' approach to quality functions will be provided to address the issue of 'integration vs independence' with respect to the roles of Programs, NASA Centers, and NASA Headquarters. Generic recommendations are offered to address the inadequacies identified in the implementation of ISS quality assurance. A reassessment by the NASA community regarding the importance of a 'quality culture' as a component within a larger 'safety culture' will generate a more effective and value-added functionality that will ultimately enhance safety.

Author

Quality Control; Safety; Space Exploration; NASA Programs

39

STRUCTURAL MECHANICS

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structures. For applications see *05 Aircraft Design, Testing and Performance*; and *18 Spacecraft Design, Testing and Performance*.

20070011544 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve

Glaser, Robert J.; Chen, Long Y.; June 27, 2006; 17 pp.; In English; 2006 Spacecraft and Launch Vehicle Dynamic Environments Workshop, 27-29 Jun. 2006, Hawthorne, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39810>

Method for calculating stress due to acceleration loading: 1) Part has been designed by FEA and hand calculation in one critical loading direction judged by the analyst; 2) Maximum stress can be due to loading in another direction; 3) Analysis procedure to be presented determines: a) The maximum Mises stress at any point; and b) The direction of maximum loading associated with the 'stress'. Concept of Mass Acceleration Curves (MAC): 1) Developed by JPL to perform preliminary structural sizing (i.e. Mariners, Voyager, Galileo, Pathfinder, MER,...MSL); 2) Acceleration of physical masses are bounded by a curve; 3) G-levels of vibro-acoustic and transient environments; 4) Convergent process before the couple loads cycle; and 5) Semi-empirical method to effectively bound the loads, not a simulation of the actual response.

Derived from text

Critical Loading; Vibrational Stress; Loads (Forces); Acoustics

20070012364 NASA Johnson Space Center, Houston, TX, USA

Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hang-ups

Cross, Robert; [2005]; 4 pp.; In English; International Topical Meeting on Probabilistic Safety Analysis, 11-15 Sep. 2005, San Francisco, CA, USA; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012364>

Until Solid Rocket Motor ignition, the Space Shuttle is mated to the Mobil Launch Platform in part via eight (8) Solid Rocket Booster (SRB) hold-down bolts. The bolts are fractured using redundant pyrotechnics, and are designed to drop through a hold-down post on the Mobile Launch Platform before the Space Shuttle begins movement. The Space Shuttle program has experienced numerous failures where a bolt has hung up. That is, it did not clear the hold-down post before liftoff and was caught by the SRBs. This places an additional structural load on the vehicle that was not included in the original certification requirements. The Space Shuttle is currently being certified to withstand the loads induced by up to three (3) of eight (8) SRB hold-down experiencing a 'hang-up'. The results of loads analyses performed for (4) stud hang-ups indicate that the internal vehicle loads exceed current structural certification limits at several locations. To determine the risk to the vehicle from four (4) stud hang-ups, the likelihood of the scenario occurring must first be evaluated. Prior to the analysis discussed in this paper, the likelihood of occurrence had been estimated assuming that the stud hang-ups were completely independent events. That is, it was assumed that no common causes or factors existed between the individual stud hang-up events. A review of the data associated with the hang-up events, showed that a common factor (timing skew) was present. This paper summarizes a revised likelihood evaluation performed for the four (4) stud hang-ups case considering that there are common factors associated with the stud hang-ups. The results show that explicitly (i.e. not using standard common cause methodologies such as beta factor or Multiple Greek Letter modeling) taking into account the common factor of timing skew

results in an increase in the estimated likelihood of four (4) stud hang-ups of an order of magnitude over the independent failure case.

Author

Booster Rocket Engines; Loads (Forces); Solid Propellant Rocket Engines; Bolts; Failure; Launching

20070012953 Naval War Coll., Newport, RI USA

Finding the Right Measures of Effectiveness for Rebuilding the State of Iraq

Bole, Bruce; May 24, 2005; 23 pp.; In English

Report No.(s): AD-A463246; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463246>

There are both conventional and intuitive ways to measure success in Iraq. Both types of measures when analyzed together give a much better picture of the progress being made in Iraq vice relying on one kind of indicator. Conventional indicators can also provide misleading information when not viewed in a comprehensive holistic fashion. This paper proposes some non conventional measures of effectiveness which can be predictive in nature when viewed from the right perspective. Iraqi moods and attitudes are hard to judge and it is imperative that all indicators are analyzed together to get a true picture for decision makers.

DTIC

Construction; Iraq; Structural Engineering

20070013330 Missouri Univ., Rolla, MO USA

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint)

Abou-Khousa, Mohamed A; Ryley, A; Kharkovsky, S; Zoughi, R; Daniels, D; Kreitinger, N; Steffes, G; Aug 2006; 11 pp.; In English

Contract(s)/Grant(s): FA8650-04-C-5704; Proj-2510

Report No.(s): AD-A463621; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Honeycomb composites are increasingly finding utility in a variety of environments and applications, such as structural components, radomes, etc. In-service and environmental stresses can produce unwanted flaws that adversely affect the structural integrity and functionality of these composites. These flaws may be in the forms of disbonds, delaminations, impact damage, crushed honeycomb, moisture intrusion, internal cracks, etc. There are several nondestructive testing (NDT) methods that may be used to inspect these composites for the presence and evaluation of these flaws. Such NDT methods include X-Ray computed tomography, near-field millimeter wave, shearography, and ultrasonic testing. To assess the capabilities of these methods for honeycomb composite inspection, two honeycomb composites panels were produced with several embedded flaws primarily representing planar disbonds at various levels within the thickness of the panels and with different shapes. Subsequently, the aforementioned NDT methods were used to produce images of the two panels. This paper presents the results of these investigations and a comparison among the capabilities of these methods.

DTIC

Honeycomb Structures; Inspection; Millimeter Waves; Nondestructive Tests; Shearography; Structural Failure; Tomography; X Rays

20070013331 Missouri Univ., Rolla, MO USA

Automated Slicing for a Multi-Axis Metal Deposition System (Preprint)

Ruan, Jianzhong; Sparks, Todd E; Panackal, Ajay; Eiamsa-ard, Kunnayut; Liou, F W; Slattery, Kevin; Chou, Hsin-Nan; Kinsella, Mary; Sep 2006; 31 pp.; In English

Contract(s)/Grant(s): FA8650-04-C-5704; Proj-2865

Report No.(s): AD-A463628; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A multi-axis adaptive slicing algorithm for multi-axis layered manufacturing which can generate optimal slices to achieve deposition without support structures is presented in this paper. Different from current adaptive slicing, this technique varies not only layer thickness but also in slicing/building direction. Aware of potential problems of previous research on slicing, the work in this paper focuses on innovative geometry reasoning and analysis tool-centroidal axis. Similar to medial axis, it contains geometry and topological information but is significantly computationally cheaper. Using a centroidal axis as a guide, the multi-axis slicing procedure is able to generate a '3-D' layer or change slicing direction as needed automatically to build

the part with better surface quality. This paper presents various examples to demonstrate the feasibility and advantages of centroidal axis and its usage in the multi-axis slicing process.

DTIC

Computer Aided Design; Computer Aided Manufacturing; Metallizing; Slicing

20070013732 NASA Marshall Space Flight Center, Huntsville, AL, USA

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models

Brown, Andrew M.; Ruf, Joe; February 22, 2007; 14 pp.; In English; International Model Analysis Conference XXV - A Conference on Structural Dynamics Society of Experimental Mechanics, 19-22 Feb. 2007, Orlando, FL, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013732>

A viewgraph presentation on a model-test based pseudo-model used to calculate side loads on rocket engine nozzles is described. The topics include: 1) Side Loads in Rocket Nozzles; 2) Present Side Loads Research at NASA/MSFC; 3) Structural Dynamic Model Generation; 4) Pseudo-Model Generation; 5) Implementation; 6) Calibration of Pseudo-Model Response; 7) Pseudo-Model Response Verification; 8) Inverse Force Determination; 9) Results; and 10) Recent Work

CASI

Acceleration (Physics); Loads (Forces); Rocket Engines; Rocket Nozzles; Nozzle Design; Dynamic Models; Dynamic Structural Analysis

42

GEOSCIENCES (GENERAL)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see *categories 42 through 48*.

20070011543 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft

Castano, Rebecca; Mazzoni, Dominic; Tang, Nghia; Greeley, Ron; Doggett, Thomas; Cichy, Ben; Chien, Steve; Davies, Ashley; August 20, 2006; 8 pp.; In English; Knowledge Discovery and Data Mining, 20-23 Aug. 2006, Philadelphia, PA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39811>

Typically, data collected by a spacecraft is downlinked to Earth and pre-processed before any analysis is performed. We have developed classifiers that can be used onboard a spacecraft to identify high priority data for downlink to Earth, providing a method for maximizing the use of a potentially bandwidth limited downlink channel. Onboard analysis can also enable rapid reaction to dynamic events, such as flooding, volcanic eruptions or sea ice break-up. Four classifiers were developed to identify cryosphere events using hyperspectral images. These classifiers include a manually constructed classifier, a Support Vector Machine (SVM), a Decision Tree and a classifier derived by searching over combinations of thresholded band ratios. Each of the classifiers was designed to run in the computationally constrained operating environment of the spacecraft. A set of scenes was hand-labeled to provide training and testing data. Performance results on the test data indicate that the SVM and manual classifiers outperformed the Decision Tree and band-ratio classifiers with the SVM yielding slightly better classifications than the manual classifier.

Author

Classifiers; Decision Theory; Downlinking; Remote Sensing; Bandwidth; Classifications; Volcanoes; Sea Ice

20070011754 Lawrence Livermore National Lab., Livermore, CA USA

Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site

Chuang, C.; Chin, S.; Mar. 15, 2006; 9 pp.; In English

Report No.(s): DE2006-894328; UCRL-PROC-219809; No Copyright; Avail.: National Technical Information Service (NTIS)

While considerable advances in the understanding of atmospheric processes and feedbacks in the climate system have led to a better representation of these mechanisms in general circulation models (GCMs), the greatest uncertainty in predictability of future climate arises from clouds and their interactions with radiation. To explore this uncertainty, cloud resolving model has been evolved as one of the main tools for understanding and testing cloud feedback processes in climate models, whereas the indirect effects of aerosols are closely linked with cloud feedback processes. In this study we incorporated an existing

parameterization of cloud drop concentration (Chuang et al., 2002a) together with aerosol prediction from a global chemistry/aerosol model (IMPACT) (Rotman et al., 2004; Chuang et al., 2002b; Chuang et al., 2005) into LLNL cloud resolving model (Chin, 1994; Chin et al., 1995; Chin and Wilhelmson, 1998) to investigate the effects of aerosols on cloud/precipitation properties and the resulting radiation fields over the Southern Great Plains.

NTIS

Aerosols; Climate Models; Clouds (Meteorology)

20070013529 NASA Johnson Space Center, Houston, TX, USA

Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument

Sarrazin, P.; Ming, D. W.; Morris, R. V.; Fernandez-Remolar, D.; Amils, R.; Arvidson, R. E.; Blake, D.; Bish, D. L.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

A field campaign was organized in September 2006 by Centro de Astobiología (Spain) and Washington University (St Louis, USA) for the geological study of the Rio Tinto river bed sediments using a suite of in-situ instruments comprising an ASD reflectance spectrometer, an emission spectrometer, panoramic and close-up color imaging cameras, a life detection system and NASA's CheMin 4 XRD/XRF prototype. The primary objectives of the field campaign were to study the geology of the site and test the potential of the instrument suite in an astrobiological investigation context for future Mars surface robotic missions. The results of the overall campaign will be presented elsewhere. This paper focuses on the results of the XRD/XRF instrument deployment. The specific objectives of the CheMin 4 prototype in Rio Tinto were to 1) characterize the mineralogy of efflorescent salts in their native environments; 2) analyze the mineralogy of salts and oxides from the modern environment to terraces formed earlier as part of the Rio Tinto evaporative system; and 3) map the transition from hematite-dominated terraces to the mixed goethite/salt-bearing terraces where biosignatures are best preserved.

Author

Mineralogy; Prototypes; Mars Surface; Robotics

20070013664 Geological Survey, Reston, VA USA

National Geomagnetism Program: Current Status and Five-Year Plan, 2006-2010

Love, J. J.; January 2006; 46 pp.; In English

Report No.(s): PB2007-106902; USGS-OFR-2006-1352; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. Geological Surveys Geomagnetism Program serves the scientific community and the broader public by collecting and distributing magnetometer data from an array of ground-based observatories and by conducting scientific analysis on those data. Preliminary, variational time-series can be collected and distributed in near-real time, while fully calibrated, absolute time-series are distributed after processing. The data are used by the civilian and military parts of the Federal Government, by private industry, and by academia, for a wide variety of purposes of both immediately practical importance and long-term scientific interest, including space-weather diagnosis and related hazard mitigation, mapping of the magnetic field and measurement of its activity, and research on the nature of the Earth's interior and the near-Earth space environment. This document reviews the current status of the Program, in terms of its situation within the Government and within the scientific community; summarizes the Program's operations, its staffing situation, and its facilities; describes the diversity of uses of Program magnetometer data; and presents a plan for the next 5 years for enhancing the Program's data-based services, developing products, and conducting scientific research.

NTIS

Geological Surveys; Geomagnetism; Magnetic Fields

20070013729 NASA Marshall Space Flight Center, Huntsville, AL, USA

Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group

Spann, J. F.; Bhattacharyya, A.; February 24, 2006; 4 pp.; In English; International Living with a Star Workshop 2006, 16-26 Feb. 2006, Goa, India; Copyright; Avail.: CASI: [A01](#), Hardcopy

The topics covered by the sessions under the working group on Ionosphere-Thermosphere-Mesosphere dealt with various aspects of the response of the ionosphere-thermosphere coupled system and the middle atmosphere to solar variability. There were four plenary talks related to the theme of this working group, thirteen oral presentations in three sessions and six poster presentations. A number of issues related to effects of solar variability on the ionosphere-thermosphere, observed using

satellite and ground-based data including ground magnetometer observations, radio beacon studies of equatorial spread F, and modeling of some of these effects, were discussed. Radar observations of the mesosphere-lower thermosphere region and a future mission to study the coupling of thunderstorm processes to this region, the ionosphere, and magnetosphere were also presented.

Author

Thermosphere; Middle Atmosphere; Mesosphere; Solar Activity; Magnetic Storms; Ionospheres

20070013740 NASA Marshall Space Flight Center, Huntsville, AL, USA

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE

Pittman, Jasna V.; Weinstock, Elliot M.; Oglesby, Robert J.; Sayres, David S.; Smith, Jessica B.; Anderson, James G.; Cooper, Owen R.; Wofsy, Steven C.; Xueref, Irene; Gerbig, Christoph; Daube, Bruce C.; Richard, Erik C.; Ridley, Brian A.; Weinheimer, Andrew J.; Loewenstein, Max; Jost, Hans-Jurg; Lopez, Jimena P.; Mahoney, Michael J.; Thompson, Thomas L.; Hargrove, William W.; Hoffman, Forrest M.; [2007]; 2 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

We use in situ measurements of water vapor (H₂O), ozone (O₃), carbon dioxide (CO₂), carbon monoxide (CO), nitric oxide (NO), and total reactive nitrogen (NO_x) obtained during the CRYSTAL-FACE campaign in July 2002 to study summertime transport in the subtropical lowermost stratosphere. We use an objective methodology to distinguish the latitudinal origin of the sampled air masses despite the influence of convection, and we calculate backward trajectories to elucidate their recent geographical history. The methodology consists of exploring the statistical behavior of the data by performing multivariate clustering and agglomerative hierarchical clustering calculations, and projecting cluster groups onto principal component space to identify air masses of like composition and hence presumed origin. The statistically derived cluster groups are then examined in physical space using tracer-tracer correlation plots. Interpretation of the principal component analysis suggests that the variability in the data is accounted for primarily by the mean age of air in the stratosphere, followed by the age of the convective influence, and lastly by the extent of convective influence, potentially related to the latitude of convective injection [Dessler and Sherwood, 2004]. We find that high-latitude stratospheric air is the dominant source region during the beginning of the campaign while tropical air is the dominant source region during the rest of the campaign. Influence of convection from both local and non-local events is frequently observed. The identification of air mass origin is confirmed with backward trajectories, and the behavior of the trajectories is associated with the North American monsoon circulation.

Author

Tropical Regions; Stratosphere; In Situ Measurement; Water Vapor; Carbon Dioxide; Carbon Monoxide; Nitric Oxide; Air Masses; Convection; Principal Components Analysis; Ozone

43

EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photography. For related instrumentation see *35 Instrumentation and Photography*.

20070011487 NASA Stennis Space Center, Stennis Space Center, MS, USA, Science Systems and Applications, Inc., Bay Saint Louis, MS, USA

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results

Blonski, Slawomir; Berglund, Judith; Spruce, Joseph P.; McKellip, Rodney; Jasinski, Michael; Borak, Jordan; Lundquist, Julie; January 2007; 18 pp.; In English

Contract(s)/Grant(s): NNS04AB54T; W-7405-Eng-48

Report No.(s): SSTI-2220-0096; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011487>

NASA's objective for the Applied Sciences Program of the Science Mission Directorate is to expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology. This objective is accomplished by using a systems approach to facilitate the incorporation of Earth observations and predictions into the decision-support tools used by partner organizations to provide essential services to society. The services include management of forest fires, coastal zones, agriculture, weather prediction, hazard mitigation, aviation safety, and homeland security. In this way, NASA's long-term research programs yield near-term, practical benefits to society. The Applied Sciences Program relies heavily on

forging partnerships with other Federal agencies to accomplish its objectives. NASA chooses to partner with agencies that have existing connections with end-users, information infrastructure already in place, and decision support systems that can be enhanced by the Earth science information that NASA is uniquely poised to provide (NASA, 2004).

Author

NASA Programs; Aircraft Safety; Decision Support Systems; Research and Development; Technologies; Marine Meteorology; Earth Sciences

20070011628 NASA Stennis Space Center, Stennis Space Center, MS, USA

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data

Holland, Donald E.; Berglund, Judith A.; Spruce, Joseph P.; McKellip, Rodney D.; [2007]; 42 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NNS04AB54T

Report No.(s): SSTI-2220-0095; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011628>

A technique was developed that uses airborne lidar terrain data to derive the necessary parameters for calculating effective aerodynamic surface roughness in urban areas. The technique provides necessary parameters for geometric models that have been used over the past 40+ years by automatically deriving the relevant geometry, orientation, and spacing of buildings and trees. In its prototypical form, this technique subsequently calculates an effective surface roughness for one-square-kilometer parcels of land for each of five geometric models. The user can define several constraints to guide processing based on a priori knowledge of the urban area or lidar data characteristics. Any given wind direction (or range of directions) can be selected to simulate conditions of variable wind flow and the impact on effective surface roughness. The operation, capabilities, and limitations of the technique were demonstrated using lidar terrain data from North Carolina and Florida.

Author

Aerodynamics; Cities; Optical Radar; Surface Roughness; Terrain; Mathematical Models; Airborne Equipment

20070011633 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

GPS

Webb, Frank H.; July 2, 2006; 77 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39801>

Geodetic networks support the TRF requirements of NASA ESE missions. Each of SLR, VLBI, GPS substantially and uniquely contributes to TRF determination. NASA's SLR, VLBI, and GPS groups collaborate toward wide-ranging improvements in the next 5 years. NASA leverages considerable resources through its significant activity in international services. NASA faces certain challenges in continuing and advancing these activities. The Terrestrial Reference Frame (TRF) is an accurate, stable set of positions and velocities. The TRF provides the stable coordinate system that allows us to link measurements over space and time. The geodetic networks provide data for determination of the TRF as well as direct science observations.

Derived from text

Global Positioning System; Very Long Base Interferometry; Rangefinding; NASA Programs; Geodesy

20070012403 NASA Dryden Flight Research Center, Edwards, CA, USA

NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science

Naftel, J. Chris; March 2007; 13 pp.; In English

Report No.(s): NASA/TM-2007-214613; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012403>

For more than 2 years, the NASA Dryden Flight Research Center has been preparing for the receipt of two Advanced Concept Technology Demonstration Global Hawk air vehicles from the USA Air Force. NASA Dryden intends to establish a Global Hawk Project Office, which will be responsible for developing the infrastructure required to operate this unmanned aerial system and establishing a trained maintenance and operations team. The first flight of a NASA Global Hawk air vehicle is expected to occur in 2008. The NASA Global Hawk system can be used by a variety of customers, including U.S. Government agencies, civilian organizations, universities, and state governments. Initially, the main focus of the research activities is expected to be Earth science related. A combination of the vehicle's range, endurance, altitude, payload power, payload volume, and payload weight capabilities separates the Global Hawk unmanned aerial system from all other platforms

available to the science community. This report describes the NASA Global Hawk system and current plans for the NASA air vehicle concept of operations, and provides examples of potential missions with an emphasis on science missions.

Author

Earth Sciences; Weather Forecasting; Pilotless Aircraft; Autonomy; Space Missions

20070012939 Army Research Lab., Aberdeen Proving Ground, MD USA

Urban Battlespace Control: A New Concept for Battle Command

O'May, Janet; Hansen, Charles; Kaste, Richard; Neiderer, Andrew; Jun 2006; 32 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463168; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463168>

An accurate picture of areas controlled by opposing forces would help commanders gauge battle progress. The Army Research Laboratory has a well-developed prototype to visualize degree of control in open battlespace regions. The system computes power projection over time and space, based on probabilities of hit and kill, position, weapon effectiveness, and damage, and updates its display as new information is received. The urban battle presents difficulties in transforming the mathematics and portraying control. This paper discusses our efforts to extend the ownership paradigm and software for urban operations. Urban ownership may be essentially categorical, rather than numerical. It is more subjective, reflecting dismounted presence, imperfect pictures of the enemy, and novel weapon utilization. To what extent is a building owned if it can be destroyed? Is a floor owned if weapons can be fired from below? Infrastructure influences (communications, water, power, transportation) must be carefully modeled, and line-of-sight issues are complex. Demographic, human-intelligence data in multi-sided operations involving civilians must be considered. Multi-dimensional regions must be displayed intuitively. This is challenging research, but with a high-payoff: predicting urban battle areas of concern in a timely way provides a significant new type of command and control decision aid.

DTIC

Cities; Display Devices; Warfare

20070013211 Naval War Coll., Newport, RI USA

Global Warming and the Combatant Commander: Engaging the Arctic Region

Burd, Michael L; Oct 23, 2006; 26 pp.; In English

Report No.(s): AD-A463334; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The National Military Strategy (NMS) describes how the U.S. Joint Force will support the National Security Strategy (NSS) and National Defense Strategy (NDS) through the establishment and execution of three military objectives. 'Protect, Prevent, Prevail' is a condensed summation of the principles behind this guidance. U.S. forward posture and presence in the global maritime environment are essential in meeting these objectives, particularly in preventing conflict and surprise attack. In describing some key aspects of a future security setting, the NMS predicts potential battle spaces far different from any in which U.S. forces currently train. The Arctic region is not specifically addressed in current versions of the NSS, NDS, or NMS. This battle space of Cold War significance, however, fits the Chairman of the Joint Chiefs of Staff's description and is reemerging as a potential theater of operations because of changes brought forth by the phenomenon known as global warming. A characteristic that clearly distinguishes the Arctic from other U.S. geographic combatant commander (GCC) areas of responsibility is that its landscape is literally changing in physical composition. This reality brings with it many significant and far-reaching security implications. GCCs and their 21st century successors will need to broaden their appreciation of the Arctic beyond its historical significance and prepare for complex security threats that could rival those of the previous century's bipolar strategic environment. GCC engagement in the region, a challenge in today's theater-strategic continuum, is necessary to prepare tomorrow's joint force for the challenges and opportunities that lie in the Arctic's not so distant future. There is an assortment of theater-strategic matters pertaining to the Arctic's future that warrant GCC attention. This paper focuses on a short list: increased maritime access, territorial disputes, and oil exploration.

DTIC

Arctic Ocean; Arctic Regions; Global Warming; Greenhouse Effect; Military Operations; Oil Exploration; Oils; Reservoirs; Security

20070013278 Naval War Coll., Newport, RI USA

Mapping the Future: Optimizing Joint Geospatial Engineering Support

Christensen, Jon L; May 16, 2006; 24 pp.; In English

Report No.(s): AD-A463495; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A detailed knowledge of the terrain is an essential element of victory at all levels of war from the tactical to the strategic, and for success across the entire spectrum of conflict. Terrain expertise and products are especially important at the operational level of war, as terrain will have a direct impact on the operational factors of space, time, and force. The operational commander must have a thorough and complete understanding of the geography within his area of operations in order to understand its effects on the operational factors, and the interactions between them. Unfortunately joint force geospatial doctrine, primarily addressed through Joint Publication 2-03: Joint Tactics, Techniques, and Procedures for Geospatial Information and Services Support to Joint Operations, is vague and has many shortcomings. In particular it does not adequately address shortfalls in database management and in the dissemination of terrain products. Additionally, there are several force structure problems within the services that contribute to the inefficiencies in geospatial information management. Finally, there is a tgd glaring need to integrate geospatial assets from all services across the joint force in order to better capitalize on available geospatial technology. This paper offers solutions to these problems, and suggests ways to maximize the potential of geospatial engineering and intelligence as a force multiplier for the Joint Commander.

DTIC

Mapping; Terrain

20070013464 Department of the Navy, Washington, DC USA

Extraction and Rendering Techniques for Digital Charting Databases

Drury, Todd P, Inventor; Jul 15, 2005; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-D020278; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This patent application discloses a method for extracting and rendering data from digital charting databases. The software method integrates and combines bathymetric/topographic data from several sources into a stream of three-dimensional data points, creating a triangular surface mesh, and then divides it into pieces along arbitrary lines to create regularly sized and shaped areas for efficient storing and rendering. The method works by forming an initial triangular mesh of the area and then refining the mesh by incrementally adding each point to the mesh until a full mesh representation is achieved. The large single file is then broken down into discrete geographic regions, and the regional data is converted into a standard file format for viewing and/or processing.

DTIC

Bathymeters; Charts; Computer Programs; Data Bases; Extraction; Image Processing; Ocean Bottom; Patent Applications; Topography

20070013576 Air War Coll., Maxwell AFB, AL USA

War without Oil: A Catalyst for True Transformation

Hornitschek, Michael J; Feb 17, 2006; 96 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463326; No Copyright; Avail.: CASI: [A05](#), Hardcopy

This monograph seeks to objectively explore the strategic energy leadership role the Department of Defense (DoD) can play within the context of its national defense mission and President Bush's 2006 Advanced Energy Initiative. By examining current and projected global energy/security environments, the energy roles of various branches of the Federal Government, and the unique responsibilities and characteristics of the DoD as America's largest single energy consumer and security instrument of national power, the author analyzes whether a methodology exists in which the DoD can lead an immediate, coherent, and viable long-term strategy toward a vision of replacing petroleum as its primary energy source while maintaining all necessary strategic and operational capability to guarantee U.S. security to 2050 and beyond. By envisioning and actively creating a post-petroleum military, the DoD not only guarantees the 'American way of war' and national security in an increasingly energy-insecure and complex security environment, but actually obligates the organization to undertake such an endeavor as a transformational lever, catalyzing the best of government, industry, and the private sector as a positive force for a more secure world.

DTIC

Catalysts; Crude Oil; Defense Program; Oils; Petroleum Products; Replacing; Warfare

20070013589 Defence Science and Technology Organisation, Edinburgh, Australia

Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter

Dong, Yunhan; Jul 2006; 83 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462947; DSTO-RR-0316; AR-013-708; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462947>

This report studies the spatial distribution of X-band, high resolution and high grazing angle polarimetric sea clutter data. The K distribution usually provides a good fit for the distribution of the VV polarised data. The HH polarised data is spikiest and its distribution exhibits a sudden departure from the K distribution in the tail region, which usually requires the KA or the similar distributions to achieve a better fit in the tail region. Due to drawbacks of the KA distribution, this report proposes the KK and WW distribution models to fit the distribution of sea clutter with spikes. It is found that the KK distribution provides overall the best fit. Distributions of the sum of K and Weibull distributed samples are also presented.

DTIC

Angles (Geometry); Clutter; Grazing; High Resolution; Seas; Superhigh Frequencies

20070013708 NASA Marshall Space Flight Center, Huntsville, AL, USA

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes

Comarazamy, Daniel E.; Gonzalez, Jorge E.; Luvall, Jeff; Rickman, Douglas L.; [2007]; 2 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

Urban sprawls in tropical locations are rapidly accelerating and it is more evident in islands where a large percentage of the population resides along the coasts. This paper focuses on the analysis of the impacts of land use and land cover for urbanization in the tropical coastal city of San Juan, in the tropical island of Puerto Rico. A mesoscale numerical model, the Regional Atmospheric Modeling System (RAMS), is used to study specific characteristics and patterns of the urban heat island in the San Juan Metropolitan Area (SJMA), the most noticeable urban core of the Caribbean. The research present in this paper makes use of the observations obtained during the airborne San Juan Atlas Mission in two ways. First, surface and rawinsonde data are used to validate the atmospheric model yielding satisfactory results. Second, airborne remote sensing information is used to update the model's surface characteristics to obtain a detailed configuration of the SJMA in order to perform the LCLU changes impact analysis. This analysis showed that the presence of San Juan has an impact reflected in higher air temperatures over the area occupied by the city, with positive values of up to 2.5 C, for the simulations that have specified urban LCLU indexes in the bottom boundary. One interesting result of the impact analysis was the finding of a precipitation disturbance shown as a difference in total accumulated rainfall between simulation with the city and with a potential natural vegetation induced by the presence of the urban area. Model results indicate that the urban-induced cloud formation and precipitation development occur mainly downwind of the city, including the accumulated precipitation. This spatial pattern can be explained by the presence of a larger urbanized area in the southwest sector of the city, and of the approaching northeasterly trade winds.

Author

Atmospheric Models; Tropical Regions; Heat Islands; Rawinsondes; Remote Sensing; Land Use; Aerial Reconnaissance

20070013711 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors

Quattrochi, Dale A.; Luvall, Jeffrey C.; Anderson, Martin; Hook, Simon; [2006]; 1 pp.; In English; 2006 Fall American Geophysical Union Meeting, 11-15 Dec. 2006, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

There is a rich and long history of thermal infrared (TIR) remote sensing data for multidisciplinary Earth science research. The continuity of TIR data collection, however, is now in jeopardy given there are no planned future Earth observing TIR remote sensing satellite systems with moderately high spatial resolutions to replace those currently in orbit on NASA's Terra suite of sensors. This session will convene researchers who have actively worked in the field of TIR remote sensing to present results that elucidate the importance of thermal remote sensing to the wider Earth science research community. Additionally, this session will also exist as a forum for presenting concepts and ideas for new thermal sensing systems with high spatial resolutions for future Earth science satellite missions, as opposed to planned systems such as the Visible/Infrared Imager/Radiometer (VIIRS) suite of sensors on the National Polar-orbiting Operational Environmental Satellite System (NPOESS) that will collect TIR data at very coarse spatial resolutions.

Author

Satellite Instruments; Remote Sensing; Data Acquisition; Infrared Detectors; Infrared Radiometers; Multidisciplinary Research; Earth Sciences

20070013712 NASA Marshall Space Flight Center, Huntsville, AL, USA

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation

Al-Hamdan, Mohammad Z.; Cruise, James F.; Rickman, Douglas L.; Quattrochi, Dale A.; January 2007; 2 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

The characterization of forested areas is frequently required in resource management practice. Passive remotely sensed data, which are much more accessible and cost effective than are active data, have rarely, if ever, been used to characterize forest structure directly, but rather they usually focus on the estimation of indirect measurement of biomass or canopy coverage. In this study, some spatial analysis techniques are presented that might be employed with Landsat TM data to analyze forest structure characteristics. A case study is presented wherein fractal dimensions, along with a simple spatial autocorrelation technique (Moran's I), were related to stand density parameters of the Oakmulgee National Forest located in the southeastern USA (Alabama). The results of the case study presented herein have shown that as the percentage of smaller diameter trees becomes greater, and particularly if it exceeds 50%, then the canopy image obtained from Landsat TM data becomes sufficiently homogeneous so that the spatial indices reach their lower limits and thus are no longer determinative. It also appears, at least for the Oakmulgee forest, that the relationships between the spatial indices and forest class percentages within the boundaries can reasonably be considered linear. The linear relationship is much more pronounced in the sawtimber and saplings cases than in samples dominated by medium sized trees (poletimber). In addition, it also appears that, at least for the Oakmulgee forest, the relationships between the spatial indices and forest species groups (Hardwood and Softwood) percentages can reasonably be considered linear. The linear relationship is more pronounced in the forest species groups cases than in the forest classes cases. These results appear to indicate that both fractal dimensions and spatial autocorrelation indices hold promise as means of estimating forest stand characteristics from remotely sensed images. However, additional work is needed to confirm that the boundaries identified for Oakmulgee forest and the linear nature of the relationship between image complexity indices and forest characteristics are generally evident in other forests. In addition, the effects of other parameters such as topographic relief and image distortion due to sun angle and cloud cover, for example, need to be examined.

Author

Resources Management; Cloud Cover; Remote Sensing; Terrain; Satellite Imagery; Forests; Cost Effectiveness; Landsat Satellites

44

ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power; and 28 Propellants and Fuels*.

20070012780 Texas Univ., Austin, TX, USA

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes

Arumugan, M.; Landsberger, S.; Nov. 11, 2006; 32 pp.; In English

Contract(s)/Grant(s): FG07-04ID14610

Report No.(s): DE2006-894912; DOE/ID/14610-1; No Copyright; Avail.: Department of Energy Information Bridge

This project focuses on the use of the Prompt Gamma-ray Activation Analysis (PGAA) technique available at the Nuclear Engineering Teaching Laboratory of the University of Texas at Austin to precisely determine the hydrogen (proton) contents in layered oxide cathode samples obtained by chemical lithium extraction in order to obtain a better understanding of the factors limiting the practical capacities and overall performance of lithium ion battery cathodes. The project takes careful precautionary experimental measures to avoid proton contamination both from solvents used in chemical delithiation and from ambient moisture. The results obtained from PGAA are complemented by the data obtained from other techniques such as thermogravimetric analysis, redox titration, atomic absorption spectroscopy, X-ray diffraction, and mass spectroscopic analysis of the evolved gas on heating. The research results broaden our understanding of the structure-property-performance relationships of lithium ion battery cathodes and could aid the design and development of new better performing lithium ion batteries for consumer (portable and electric vehicles), military, and space applications.

NTIS

Activation Analysis; Cathodes; Education; Electric Batteries; Extraction; Gamma Rays; Hydrogen; Lithium

20070013346 Naval War Coll., Newport, RI USA

Africa Command: An Interagency Solution and SOF's Role

Malatesta, Daniel P; Oct 10, 2006; 27 pp.; In English

Report No.(s): AD-A463703; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The continent of Africa has been plagued for decades with problems of poverty, poor governance, genocide, and regional

conflicts. In the post-9/11 world we live in, the USA can no longer afford to ignore the continent, not only because of terrorism concerns, but also because of our need for secure energy sources. With the impending announcement of a new combatant command for Africa, the U.S. Government should utilize this unique opportunity to enhance its ability to integrate all the instruments of national power at the regional level. In order to accomplish this, the structure of the new combatant command for Africa must blend civil-military leadership at all levels to create a body which can truly integrate the U.S. Government's efforts on the continent. Additionally, in analyzing the need for U.S. Military personnel to support his command's mission, the new commander should rely on special operation forces as the primary effort because of their expert capabilities, holistic approach, and pre-established command and control relationships.

DTIC

Africa; Military Personnel; Terrorism; Warfare

20070013357 Georgia Inst. of Tech., Atlanta, GA USA

Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators

Zana, I; Herrault, F; Arnold, D P; Allen, M G; Jan 2005; 5 pp.; In English

Contract(s)/Grant(s): DAAD19-01-2-0010

Report No.(s): AD-A463729; No Copyright; Avail.: CASI: [A01](#), Hardcopy

We present and characterize a process to pattern magnetic poles on small permanent-magnet (PM) rotors used in microscale, axial-flux, PM machines. Unlike other previously reported approaches, this approach uses a ferromagnetic magnetizing head (MH) and an externally applied magnetic field, and it offers the potential for moderate scalability and batch-magnetization of multiple parts. The process is verified using 8-pole annular PM rotors with thicknesses of 500 micrometers and 9.5 mm outer diameters. 3-D magnetostatic, finite element analysis (FEA) is employed to examine the process and to verify the experimental magnetization patterns.

DTIC

Electric Generators; Permanent Magnets; Rotors

20070013358 Georgia Inst. of Tech., Atlanta, GA USA

Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation

Arnold, David P; Cros, Florent; Glover, Tiffany; Allen, Mark G; Hillman, Keithan; Veazie, David; Jan 2003; 6 pp.; In English

Contract(s)/Grant(s): DAAG55-98-1-0292

Report No.(s): AD-A463730; No Copyright; Avail.: CASI: [A02](#), Hardcopy

This paper presents recent advances in the development of materials and fabrication methods for high temperature (400 - 900 C) magnetic micro-machine for electrical power generation. Suitable materials and material compatibility issues are identified for the device conductors, magnetic cores, and bulk structure. Two fabrication methods for encapsulating electroplated structures inside fusion bonded silicon wafers are presented. These fabrication techniques enable the integration of thick conductive and magnetic materials into multi-wafer silicon MEMS devices. Electrical tests verify the integrity of electroplated Cu conductors after wafer bond annealing and mechanical tests confirm that the presence of the metal does not adversely affect the bond strength. Preliminary results of electrodeposited ferromagnetic Fe-Co materials are also discussed.

DTIC

Electric Generators; Electric Power Plants; Fabrication; High Temperature; Magnetic Materials; Turbines

20070013359 Georgia Inst. of Tech., Atlanta, GA USA

Micro Magnetic Induction Machines for Portable Power Applications

Cros, Florent; Arnold, David P; Allen, Mark G; Das, Sauparna; Koser, Hur; Lang, Jeffrey H; Jan 2003; 6 pp.; In English

Contract(s)/Grant(s): DAAG55-98-1-0292

Report No.(s): AD-A463731; No Copyright; Avail.: CASI: [A02](#), Hardcopy

This paper presents recent advances in the development of a micro magnetic induction motor/generator. The development of this machine is part of an ongoing project to develop high-power-density electric machinery for use in portable power applications. The results reported here focus on testing a first-generation non-laminated tethered motor, and fabricating a second-generation laminated tethered motor. These tethered motors are metrology devices designed for exploring and characterizing the fabrication and operating behavior of the micro magnetic induction machine.

DTIC

Electric Generators; Electric Power Plants; Magnetic Induction

20070013542 Foley and Lardner, LLP, Madison, WI, USA

Carbon Nanotube Schottky Barrier Photovoltaic Cell

Narkis, T. R.; Marcus, M. S.; Lagally, M. G.; Eriksson, M. A.; 2 Mar 05; 14 pp.; In English

Contract(s)/Grant(s): NSF 0079983

Patent Info.: Filed Filed 2 Mar 05; US-Patent-Appl-SN-11-070-834

Report No.(s): PB2007-101680; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Carbon nanotube Schottky barrier photovoltaic cells and methods and apparatus for making the cells are provided. The photovoltaic cells include at least one contact made from a first contact material, at least one contact made from a second contact material and a plurality of photoconducting carbon nanotubes bridging the contacts. A Schottky barrier is formed at the interface between the first contact material and the carbon nanotubes while at the interface between the second contact material and the carbon nanotubes, a Schottky barrier for the opposite carrier is formed, or a small, or no Schottky barrier is formed. It is the Schottky barrier asymmetry that allows the photo-excited electron-hole pairs to escape from the carbon nanotube device.

NTIS

Carbon Nanotubes; Photovoltaic Cells; Solar Cells

45

ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20070011494 Environmental Protection Agency, Washington, DC, USA

Estimating Emissions Associated with Portable Fuel Containers (PFCs)

Feb. 2007; 30 pp.; In English

Report No.(s): PB2007-106741; EPA/420/R-07/001; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Portable fuel containers (PFCs, or gas cans) are consumer products used to refuel a wide variety of gasoline-powered equipment. California has established an emissions control program for gas cans which began in 2001. Since then, some other states have adopted the California requirements. Last year, California adopted a revised program. EPA is planning to propose standards to control VOCs as an ozone precursor and also to minimize exposure to VOC-based toxics such as benzene and toluene. Gasoline is highly volatile and evaporates easily from containers that are not sealed or closed properly. Although an individual gas can is a relatively modest emission source, the cumulative VOC emissions from estimated population of 80 million gas cans are quite significant. Left uncontrolled, the evaporative emissions from a gas can are up to 60 times the VOC of a new Tier 2 vehicle evaporative control system. Gas can emissions are primarily of three types: evaporative emissions from unsealed or open containers; permeation emissions from gasoline passing through the walls of the plastic containers; and evaporative emissions from gasoline spillage during use. This report proposes an approach to estimating the VOC inventory associated with PFCs used for gasoline. (This analyses does not consider PFCs used for either kerosene or diesel fuel.)

NTIS

Air Pollution; Cans; Estimating; Pollution Control

20070011518 Environmental Protection Agency, Research Triangle Park, NC, USA

Quality Assurance Handbook for Air Pollution Measurement Systems. Volume 2. Ambient Air Specific Methods (Interim Edition)

Apr. 1994; 743 pp.; In English

Report No.(s): PB2007-107080; EPA/600/R-94/038B; No Copyright; Avail.: CASI: [A99](#), Hardcopy

This document represents Volume II of a 5-volume quality assurance (QA) handbook series dedicated to air pollution measurement systems. Volume II is dedicated to the Ambient Air Quality Surveillance Program and the data collection activities of that program. The intent of the document is twofold. The first is to provide additional information and guidance on the material covered in the Code of Federal Regulations pertaining to the Ambient Air Quality Surveillance Program. The second is to establish a set of consistent QA practices that will improve the quality of the nation's ambient air data and ensure data comparability among sites across the nation. Therefore, the document is written for technical personnel at State and local monitoring agencies and is intended to provide enough information to develop a quality for ambient air quality monitoring.

NTIS

Air Pollution; Chemical Analysis; Handbooks; Quality Control

20070011520 PRC Environmental Management, Inc., Cincinnati, OH, USA

Environmental Technology Verification Report: Field Portable X-ray Fluorescence Analyzer. Niton XL Spectrum Analyzer

Mar. 1998; 96 pp.; In English

Contract(s)/Grant(s): EPA-68-CO-0047

Report No.(s): PB2007-107083; No Copyright; Avail.: CASI: [A05](#), Hardcopy

The U.S. Environmental Protection Agency (EPA) is charged by Congress with protecting the Nations land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, the EPAs Office of Research and Development (ORD) provides data and science support that can be used to solve environmental problems and to build the scientific knowledge base needed to manage our ecological resources wisely, to understand how pollutants affect our health, and to prevent or reduce environmental risks. The National Exposure Research Laboratory (NERL) is the Agencys center for the investigation of technical and management approaches for identifying and quantifying risks to human health and the environment. Goals of the Laboratorys research program are to develop and evaluate technologies for the characterization and monitoring of air, soil, and water; support regulatory and policy decisions; and provide the science support needed to ensure effective implementation of environmental regulations and strategies.

NTIS

Dust; Lead (Metal); Spectrum Analysis; X Ray Fluorescence

20070011525 Tennessee Valley Authority, Washington, DC, USA

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues)

Dec. 2003; 4 pp.; In English

Report No.(s): PB2007-106271; No Copyright; Avail.: CASI: [A01](#), Hardcopy

In July 2003, TVA produced a 29-page report entitled, 'How clean is the air. Air Quality in the Tennessee Valley Region.' This report looks back on 24 years of air quality in the east-central USA, considering trends from 1979 through 2002. In addition to examining problems associated with federal clean air standard pollutants, the report considers acid rain, hazardous (i.e., toxic) air pollution, fine particulates, indoor air quality, visibility impairment, and global climate change. Clean air 'yardsticks'--National Ambient Air Quality Standards (NAAQS)--were established by the U.S. EPA in 1971, following the 1970 Clean Air Act Amendments. There are two kinds of NAAQS: (1) 'Primary standards,' which set air quality limits protective of public health, and (2) 'Secondary standards,' which set limits protecting public welfare, including animals, crops, vegetation, materials, and visibility. Current NAAQS include six air pollutants (often referred to as 'criteria pollutants'): particulate matter, sulfur dioxide, ozone, carbon monoxide, nitrogen dioxide, and lead. In order to keep these NAAQS standards current, the U.S. EPA periodically reviews and, if warranted, updates these standards to keep in step with new findings.

NTIS

Air Pollution; Air Quality; Pollution Control; Tennessee Valley (AL-KY-TN); Trends

20070011530 Tennessee Valley Authority, Washington, DC, USA

Role of Renewable Energy in Reducing Greenhouse Gas Buildup. ('On the Air' Technical Notes on Important Air Quality Issues)

Sep. 2003; 4 pp.; In English

Report No.(s): PB2007-106272; No Copyright; Avail.: CASI: [A01](#), Hardcopy

Unlike electricity produced from the combustion of fossil fuels, electricity produced from solar, wind, landfill gas, biomass, and increasing existing hydroelectric capacity does not contribute to the buildup of greenhouse gases (GHG) in the atmosphere. Such renewable energy sources appear to be one way that utilities can address the buildup of GHG, thus reducing the potential impact on climate change. In the Tennessee Valley, the modernization of hydroelectric facilities is the least expensive method among those listed per unit of power generated. Co-firing wood waste with fossil fuel is second. But when emphasis is placed on reducing GHG emissions alone, landfill gas and co-firing wood waste are the most cost-effective methods. One approach to addressing the Administration's Global Climate Change Initiative may include increasing the use of renewable energy sources in electric power production. TVA is evaluating renewable energy sources, along with other types of GHG mitigation technologies and options, to determine the costs and problems associated with integrating them into the system and the timing of implementation.

NTIS

Air Quality; Greenhouse Effect; Renewable Energy

20070011571 Tennessee Valley Authority, Washington, DC, USA

Modeling Air Quality Recent Advances and Challenges. ('On the Air' Technical Notes on Important Air Quality Issues)

Jul. 2003; 4 pp.; In English

Report No.(s): PB2007-106279; No Copyright; Avail.: National Technical Information Service (NTIS)

Due to advances in air quality modeling, scientists can now evaluate the regional impact of various emission control scenarios on many pollutants simultaneously. These complex models combine meteorological and emissions data to project atmospheric chemical reactions for an array of pollutants across large regions. Decisions about air quality regulations and emissions control strategies have been heavily influenced for years by the predictions of atmospheric models. The accuracy of these complex models and the manner in which they are applied is becoming increasingly important, as regulatory agencies and interest groups become ever more reliant upon their outputs. Air quality management has a long history of relying on atmospheric models to guide decision-making. Those decisions affect our daily lives, ranging from the vehicles we drive to the paint we use. They also impact how power plants are designed and operated. Indeed, air quality modeling was a factor in TVA's management of fossil-fueled facilities in the past, continues to be essential today, and no doubt will affect management decisions even more in the future.

NTIS

Air Pollution; Air Quality; Atmospheric Models

20070011577 California Univ., Berkeley, CA, USA, Aerosol Dynamics, Inc., Berkeley, CA, USA

Analysis of Particulate Nitrate and Black Carbon Time Series

Millstein, D. E.; Harley, R. A.; Hering, S. V.; Nov. 2006; 78 pp.; In English

Contract(s)/Grant(s): A-57

Report No.(s): PB2007-106973; CRC-A-57; No Copyright; Avail.: National Technical Information Service (NTIS)

The main objective of this research is to describe seasonal, weekly, and diurnal patterns in fine particulate BC and nitrate. Past studies have relied mainly on filter-based PM measurements as the starting point for time series analysis. These studies have focused on spatial and seasonal PM variations. Most of the historical record of speciated PM measurements, typically collected over 24-hour sampling periods once every 6th day, is unsuitable for study of diurnal and weekly patterns. In contrast, online measurements of BC/EC and nitrate can provide hourly or better time-resolved data that permit high resolution analyses.

NTIS

Carbon; Diurnal Variations; Nitrates; Particulates; Time Series Analysis

20070011673 Tennessee Valley Authority, Washington, DC, USA

Changing Face of Ozone Management. ('On the Air' Technical Notes on Important Air Quality Issues)

Oct. 2003; 4 pp.; In English

Report No.(s): PB2007-106280; No Copyright; Avail.: National Technical Information Service (NTIS)

Ground-level ozone pollution presents a complex air quality management issue. TVA conducted research as part of the Southern Oxidant Studies during the 1990s to improve the understanding of factors controlling ozone pollution. These studies confirmed that, in the southeastern U.S., abundant natural biogenic sources (vegetation) dominate emissions of one class of ozone precursors, volatile organic compounds (VOCs). As a consequence, ozone management must be achieved primarily through control of NOX emissions, the principal anthropogenic precursor of ozone. Improved understanding of ozone production and transport has led to significant changes in environmental management strategies to reduce ozone pollution. Nevertheless, meeting the recently revised national 8-hour ozone standard will prove a considerable challenge. There is now increased emphasis on NOX controls to help manage eastern ozone pollution.

NTIS

Air Pollution; Air Quality; Ozone; Pollution Control

20070011675 Tennessee Valley Authority, Washington, DC, USA

Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4

January 2006; 4 pp.; In English

Report No.(s): PB2007-106285; No Copyright; Avail.: CASI: [A01](#), Hardcopy

Nitrogen oxide, or NOx, is a compound of nitrogen and oxygen that is a byproduct of coal combustion. NOx is an air pollutant that contributes to the formation of acid rain and ground-level ozone. As part of its systemwide goal of reducing NOx

emissions by over 78 percent, the Tennessee Valley Authority (TVA) is proposing to install selective noncatalytic reduction systems (SNCRs) on Units 2, 3, and 4, or any combination of these units, at the Johnsonville Fossil Plant (JOF). An SNCR system was installed previously on JOF Unit 1, and the SNCR systems for one or more of the other three units would be operational by 2009. The SNCR process involves the precise injection of a urea-water solution into the flue gas as it exits the boiler. In a series of chemical reactions, the urea reacts with NO_x to form elemental nitrogen, carbon dioxide, and water vapor. TVA has prepared an Environmental Assessment (EA) that is incorporated by reference.

NTIS

Air Pollution; Fossil Fuels; Fossils; Pollution Control; Tennessee Valley (AL-KY-TN)

20070011676

Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee

May 2006; 59 pp.; In English

Report No.(s): PB2007-106286; No Copyright; Avail.: CASI: [A04](#), Hardcopy

In 2005, the Tennessee Valley Authority (TVA) installed a selective noncatalytic reduction (SNCR) system on Unit 1 at Johnsonville Fossil Plant to reduce NO_x emissions. Results have been favorable, and TVA now proposes to install SNCR on Units 2, 3, and 4 and to operate the SNCR systems year-round. The two main issues addressed in the environmental review were air quality and water quality, including the potential effects of water-quality degradation on threatened and endangered mussels. Both air quality and water quality are potentially affected by ammonia slip (i.e., the passage of unreacted ammonia through the flue gas). Analysis indicated that overall air quality would benefit from implementing the proposed action. Operation of the proposed SNCR system on the four units would reduce NO_x emissions, which would also reduce ozone formation. Similarly, water-quality degradation (primarily from the presence of unreacted ammonia, i.e., ammonia slip) would be minor and insignificant. Outfall discharges would be managed to comply with permit requirements. Also, because there is a large amount of mixing at the outfall, ammonia concentrations in the Tennessee River would be below toxic levels for mussels. Therefore, there would be no effects to endangered mussel species in the Tennessee River. Overall, potential environmental impacts would be minor and insignificant.

NTIS

Air Pollution; Fossil Fuels; Fossils; Pollution Control; Tennessee

20070011677

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee

January 2005; 4 pp.; In English

Report No.(s): PB2007-106287; No Copyright; Avail.: CASI: [A01](#), Hardcopy

The east pond at the Tennessee Valley Authority (TVA) Allen Fossil Plant (ALF) is an ash easement area used to receive sluiced boiler slag and fly ash. Most of the ash deposited in the east pond is either fly ash or slag fines not reclaimed by Reed Minerals for use in industrial abrasives. This pond is required to maintain 158,400 cubic yards of free water volume in order to comply with its National Pollutant Discharge Elimination System (NPDES) permit conditions. To maintain this volume, it has been necessary to construct a temporary dredge cell within this pond to receive ash hydraulically dredged from the rest of the pond. Dredged ash is being reclaimed from the dredge cell for other small structural fill projects in the vicinity of the plant. This process currently works, but the dredge cell could fill up within the next 24 months and, therefore, could affect TVA's ability to maintain the appropriate free water volume in the pond for compliance with NPDES requirements. TVA must decide whether to (1) continue the status quo for managing the ash generated at ALF in the east pond on easement property, which is nearing capacity, or (2) develop a different strategy for management of the ash. TVA has prepared a Final Environmental Assessment (FEA) to understand better the impacts associated with the proposed action. The FEA is attached and incorporated by reference.

NTIS

Air Pollution; Ashes; Fly Ash; Fossil Fuels; Fossils; Management Planning; Pollution Control; Solid Wastes; Tennessee; Tennessee Valley (AL-KY-TN); Waste Disposal

20070011678 Tennessee Valley Authority, Washington, DC, USA

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee

January 2005; 5 pp.; In English

Report No.(s): PB2007-106288; No Copyright; Avail.: CASI: [A01](#), Hardcopy

The purpose of the proposed project is to reduce sulfur dioxide (SO₂) emissions from Kingston Fossil Plant (KIF) by installing flue gas desulfurization (FGD) or scrubber equipment that employs the wet limestone forced oxidation technology. Installation of the scrubber at KIF would assist the Tennessee Valley Authority (TVA) in reducing systemwide SO₂ emissions to meet requirements under the 1990 Clean Air Act amendments, as well as maintaining compliance with the U.S. Environmental Protection Agency's Title IV regulations for the Acid Rain Program. The Title IV regulations require reductions and caps for utility industry SO₂ emissions. Compliance with the regulations is based on emission allowances. TVA's current SO₂ allocation allowance per year is approximately 430,000 tons. In 2004, TVA's emissions were 492,603 tons, and compliance was maintained by utilizing banked SO₂ emission allowances.

NTIS

Desulfurizing; Flue Gases; Fossil Fuels; Installing; Pollution Control; Air Pollution; Sulfur Dioxides

20070011679 Tennessee Valley Authority, Washington, DC, USA

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee

Apr. 2006; 101 pp.; In English

Report No.(s): PB2007-106296; No Copyright; Avail.: National Technical Information Service (NTIS)

The Tennessee Valley Authority (TVA) has prepared an Environmental Assessment (EA) of a proposal to reduce sulfur dioxide (SO₂) emissions at Kingston Fossil Plant (KIF) by installing flue gas desulfurization equipment that employs the wet limestone forced oxidation technology. TVA needs to reduce systemwide SO₂ emissions to meet requirements under the 1990 Clean Air Act amendments. Reductions at KIF would help TVA meet those requirements. This EA considers the impacts of both a No Action and an Action Alternative. Issue areas identified in scoping of potential environmental impacts and subsequently analyzed in the EA were air resources; solid waste and groundwater; transportation; natural areas and recreation; visual resources; surface water and wastewater; noise; wetlands; floodplains and flood risk; aquatic life; terrestrial ecology; endangered, threatened, and rare species; cultural resources; socioeconomic; and environmental justice, and prime farmland. With identified mitigations, environmental impacts to these resources were found to be insignificant.

NTIS

Air Pollution; Desulfurizing; Flue Gases; Fossil Fuels; Pollution Control; Sulfur Oxides; Air Quality

20070011680 Tennessee Valley Authority, Washington, DC, USA

Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee

Oct. 2006; 15 pp.; In English

Report No.(s): PB2007-106297; No Copyright; Avail.: National Technical Information Service (NTIS)

The Tennessee Valley Authority (TVA) proposes to improve operation of the high-dust selective catalytic reduction (SCR) systems installed on Units 1, 2, and 3 of Allen Fossil Plant (ALF) in order to optimize (e.g., achieve or exceed) expected performance levels. As designed, the three SCR units at ALF were expected to remove 90 percent of the emissions of oxides of nitrogen (NO_x) at 2 parts per million by volume (ppmv) ammonia slip (TVA 2001). Ammonia slip is the amount of unreacted ammonia from the SCR system that enters the waste stream. A supplemental environmental assessment (EA) is needed to assess the impacts of operating SCR units at higher ammonia injection rates while still meeting the environmental requirements for NO_x reduction in the permit and the recently finalized Clear Air Interstate Rule (CAIR). Testing during the summers of 2005 and 2006 revealed that the SCR units at ALF operate at approximately 4 ppmv ammonia slip at 3 percent oxygen by volume at the SCR outlet, achieving approximately 92 percent NO_x reduction. Although the operating ammonia slip is above the level assessed in the EA for the installation of SCR systems on ALF Units 1, 2, and 3 (TVA 2001), the plant is operating in full compliance with the requisite air and water quality permits.

NTIS

Air Pollution; Catalysts; Fossil Fuels; Nitrogen Oxides; Pollution Control; Electric Power Plants

20070011681 Tennessee Valley Authority, Chattanooga, TN, USA

Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee

Parr, K.; Aug. 2006; 81 pp.; In English

Report No.(s): PB2007-106300; No Copyright; Avail.: National Technical Information Service (NTIS)

The east pond at the Tennessee Valley Authority (TVA) Allen Fossil Plant (ALF) is an ash easement area used to receive

sluiced boiler slag and fly ash. Currently, Reed Minerals reclaims most of the boiler slag and processes it for use in industrial abrasives. Therefore, most of the ash deposited in the east pond is either fly ash or slag fines not reclaimed by Reed Minerals. This pond is required to maintain 158,400 cubic yards of free water volume in order to comply with its National Pollutant Discharge Elimination System permit conditions. In order to maintain this volume, it has been necessary to construct a temporary dredge cell within this pond to receive ash dredged from the rest of the pond. Dredged ash is being reclaimed from the dredge cell for other small structural fill projects in the vicinity of the plant. This process currently works, but the dredged cell could fill up within the next 24 months. TVA must decide whether (1) to continue to send the ash generated at ALF to the east pond on easement property, which is nearing capacity, or (2) to develop a different strategy for management of the ash. In this Environmental Assessment, TVA has considered six alternatives for utilization or disposal of the ash.

NTIS

Air Pollution; Damage Assessment; Environmental Surveys; Fossil Fuels; Pollution Control; Solid Wastes; Waste Disposal; Electric Power Plants; Fly Ash; Combustion Products

20070011752 Texas A&M Univ., College Station, TX USA

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs

Morse, J. W.; January 2006; 158 pp.; In English

Report No.(s): DE2006-894253; No Copyright; Avail.: National Technical Information Service (NTIS)

There is undeniable evidence that concentration of carbon dioxide in the atmosphere is rising at an increasingly rapid rate primarily as the result of burning fossil fuels. Although the debate continues, most of the scientific community believes that higher levels of atmospheric CO₂ will lead to a significant warming of the Earth's climate and that there is already evidence that this is occurring. There are two ways to ameliorate this problem. One is to significantly reduce production of CO₂, which is primarily a political-economic problem, and the other is to remove CO₂ from emissions and/or the atmosphere and find some way to sequester it. Several possible ways to sequester CO₂ are under investigation or have been suggested. These include removal by chemical reaction, deep seabed disposal, and pumping supercritical CO₂ into various subsurface environments. Sequestration of carbon dioxide in depleted gas reservoirs appears to be a viable option, with a possible economic spin-off from the recovery of significant gas reserves. At the elevated temperatures and pressures encountered in reservoirs, carbon dioxide behaves as a supercritical fluid. Under these conditions, little was known regarding the diffusion of carbon dioxide in natural gas, and displacement of natural gas by carbon dioxide. A major objective of this research was to obtain the necessary data to model these processes. Also, the added CO₂ will react with reservoir waters that are often chemically complex high ionic strength brines making them more acidic. This can result in the dissolution of calcium carbonate (calcite) that is a common host rock or sandstone cement in reservoirs and lead to potentially serious problems for CO₂ injection and the integrity of the reservoir. It was consequently a second major objective of this project to determine calcite solubility and dissolution kinetics in solutions representative of subsurface brines and produce a general dissolution rate equation. Both objectives were accomplished. Reservoir simulations indicated a large amount of CO₂ would be sequestered, with the amount depending on reservoir water saturation. Simulation results also indicate a significant amount of natural gas could be produced. For an 80-acre pattern, natural gas production was calculated to be 3.2 BSCF or 63% of remaining gas-in-place for 30% reservoir water saturation. Gas revenues would help defray the cost of CO₂ sequestration. Therefore, CO₂ sequestration in depleted gas reservoirs appears to be a win-win technology. Considerable effort went into testing and refining the ability to predict calcite solubility in brines using a Pitzer-equation based computer model, with particular difficulties being encountered in solutions with high dissolved calcium concentrations. After that was accomplished, calcite dissolution kinetics were determined a wide range of brine compositions both including and not including potential inhibitors from 25 to 83 °C and a CO₂ partial pressure from 0.1 to 1 atm. The reaction was found to be first order for undersaturations of 0.2 to 1 and was surface controlled. The rate constant was fit to a multiple regression model, thus making it possible to predict calcite dissolution rates over a wide range of solution compositions, partial pressures of CO₂ and temperature. Results indicate that equilibrium is likely to be reached relatively quickly in front of an advancing supercritical CO₂ fluid.

NTIS

Carbon Dioxide; Carbonates; Depletion; Mass Transfer; Natural Gas; Reaction Kinetics; Reservoirs

20070012617 Agency for Toxic Substances and Disease Registry, Atlanta, GA USA

Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333)

Feb. 27, 2007; 113 pp.; In Spanish

Report No.(s): PB2007-107191; No Copyright; Avail.: National Technical Information Service (NTIS)

The late Congressman Frank Tejeda (1945-1997) initially petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to evaluate the potential public health impact of contaminants released from Kelly Air Force Base. This evaluation request subsequently extended to East Kelly as well. Community members in the East Kelly area are concerned that they may have been exposed to contaminants from the Kelly AFB east annex via stormwater runoff, shallow groundwater, blowing dust, and soil gas. Community members further believe these contaminants could cause various adverse health effects, including cancer, immune system disorders, nervous system disorders, birth defects, liver problems, skin problems, respiratory illnesses, muscular problems, nosebleeds, and headaches. After reviewing available environmental and health outcome data, ATSDR has determined that the levels of contaminants detected at off-site locations associated with East Kelly Air Force Base are not likely to cause adverse health effects. The agency concludes that the contaminants at East Kelly pose no apparent public health hazard. Data were inconclusive regarding on-site indoor air exposures for other than industrial and limited commercial uses. ATSDR categorizes on-site exposure for uses other than industrial and limited commercial as an indeterminate public health hazard. Because of community concerns, ATSDR evaluated contaminated surface soil from area S009 within the East Kelly site. The evaluation sought to determine whether chemicals at levels of health concern could migrate off site via stormwater runoff or wind-blown dust. Soil gas samples were evaluated to determine whether residents near East Kelly are currently exposed to volatile organic compounds migrating into their homes from the contaminated shallow groundwater. Data from shallow-aquifer private wells were reviewed to determine whether residents near East Kelly are exposed to contaminated groundwater.

NTIS

Assessments; Contaminants; Public Health; Risk; Texas; Toxic Diseases

20070012619 AVL, Plymouth, MI, USA

Fuel Chemistry Impacts in Gasoline HCCI

Shen, Y.; Dec. 2006; 136 pp.; In English

Contract(s)/Grant(s): AVFL-13

Report No.(s): PB2007-106989; CRC-AVFL-13; No Copyright; Avail.: National Technical Information Service (NTIS)

In this study, ten gasoline-like test fuels of varying octane quality, composition, and distillation were tested by AVL of Plymouth, MI on a single cylinder engine equipped with a hydraulic variable valve train (VVT) and a gasoline direct injection (GDI) system. These fuels were tested using three different HCCI operating modes: (1) Re-compression early injection (RCEI); (2) Re-compression split injection (RCSI); and (3) Re-breathing early injection (RBEI). For each mode, three engine operating conditions were investigated: (1) 1.5 bar IMEP at 1000 rpm; (2) 3 bar IMEP at 2000 rpm; and (3) 5.5 bar/deg of maximum rate of pressure rise at 3000 rpm (IMEPs very near 3 bar). In summary, this study provided no definitive associations between fuel properties and HCCI engine performance in general. However, it did identify some important specific meaningful results.

NTIS

Diesel Engines; Gasoline; Ignition

20070012781 Arkansas Univ., Fayetteville, AR, USA, Institute of Gas Technology, Des Plaines, IL USA

LNG Safety Research: FEM3A Model Development

Salehi, I. A.; Havens, J.; Spicer, T.; Oct. 31, 2006; 10 pp.; In English

Contract(s)/Grant(s): DE-FG26-04NT42030

Report No.(s): DE2006-894906; No Copyright; Avail.: Department of Energy Information Bridge

This quarterly report for DE-FG26-04NT42030 covers a period from July 1, 2006 to October 31, 2006. GTI's activities during the report quarter were limited to administrative work. The work at the University of Arkansas continued in line with the initial scope of work and the identified questions regarding surface to cloud heat transfer as being largely responsible for the instability problems previously encountered. A brief summary of results is discussed in this section and the complete report from University of Arkansas is attached.

NTIS

Liquefied Natural Gas; Safety; Models; Research and Development

20070013492 Pacific Northwest National Lab., Richland, WA, USA

Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report

Kaspar, B.; Dillon, H. E.; Jul. 14, 2006; 6 pp.; In English

Contract(s)/Grant(s): FG26-04NT42123

Report No.(s): DE2006-892238; No Copyright; Avail.: Department of Energy Information Bridge

One goal of the Building Energy Codes Program (BECF) is to provide useful, easy to understand information about the national energy codes. A forum where users could ask for, and receive clarification on these codes and software from other users would allow the Energy codes project to reach and instruct a broader audience for a modest resource cost. The forum proposed would be a staff moderated discussion board where staff would post topics, and users would post discussion of those topics, with staff joining in to the discussions. The forum would be moderated by staff members, to remove objectionable and irrelevant postings, and to answer any technical questions that arise. The topics and discussions would be archived and searchable to allow users to answer their own questions, if they pertain to a previously discussed topic.

NTIS

Atlantic Ocean; Carbon Dioxide; Carbonates; Carbonic Acid; Flue Gases; Sorbents; Strata

20070013508 Denver Univ., Denver, CO, USA

On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007

Bishop, G. A.; Stadmuller, R.; Stedman, D. H.; Feb. 2007; 48 pp.; In English

Contract(s)/Grant(s): E-23-9

Report No.(s): PB2007-106988; CRC-E-23-9-7; No Copyright; Avail.: National Technical Information Service (NTIS)

The University of Denver has completed the nine years of a multi-year remote sensing study in the Chicago area, with measurements made in September of 1997 through 2000, 2002, 2004 and 2006. The remote sensor used in this study is capable of measuring the ratios of CO, HC, and NO to CO₂ in motor vehicle exhaust. From these ratios, we calculated the percent concentrations of CO, CO₂, HC and NO in the exhaust that would be observed by a tailpipe probe, corrected for water and any excess oxygen not involved in combustion. Mass emissions per mass or volume of fuel were also determined. The system used in this study was configured to determine the speed and acceleration of the vehicle, and was accompanied by a video system to record the license plate of the vehicle. Having collected seven data sets over a nine year period at the same time and location, it is possible to show the 'deterioration' of specific model year fleets from one year to the next. When the restriction of the fleet was made to only those model years observed during the first measurements in 1997, the 1983-1997 model year vehicles have had rather flat emissions with age, counter to the traditionally expected view of emissions deterioration. Another way of phrasing this is that the fleet fraction of gross emitters first seen in 1997 has remained the same for that model year grouping even though that original fleet has aged 9 years and the remainder of that original fleet numbers 4,238. It is unlikely that I/M or fuel programs are the reason for this observation. Continuing studies at the same site and at non I/M, non-special fuels contribute to reducing motor vehicle fleet emissions deterioration compared with fleet turnover.

NTIS

Automobiles; Exhaust Emission; Remote Sensing; Roads

20070013682 National Inst. for Occupational Safety and Health, Cincinnati, OH USA

Respiratory Disease in Agricultural Workers: Mortality and Morbidity Statistics

Feb. 2007; 318 pp.; In English

Report No.(s): PB2007-106807; DHHS/PUB/NIOSH-2007-106; No Copyright; Avail.: CASI: [A14](#), Hardcopy

Respiratory Disease in Agriculture: Mortality and Morbidity Statistics presents summary tables and figures of occupational respiratory disease surveillance data focusing on various occupationally relevant respiratory diseases for the Agriculture, Forestry, and Fishing industries. The report has seven major sections that provide the following data: (1) highlights and data usage limitations; (2) demographic statistics for agricultural workers; (3) mortality statistics for agricultural workers, including by sex and race/ethnicity; (4) morbidity statistics for agricultural workers, including by sex, race/ethnicity, smoking status, and source of data; (5) recommendations to fill research gaps for respiratory disease in agriculture; and (6) appendices with descriptions of data sources, methods, and other supplementary information.

NTIS

Agriculture; Mortality; Personnel; Respiratory Diseases

20070013683 National Heart, Lung and Blood Inst., Bethesda, MD, USA

Asthma and Physical Activity in the School: Making a Difference

Sep. 1995; 24 pp.; In English

Report No.(s): PB2007-106847; NIH/PUB-95-3651; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Asthma is a chronic lung condition with ongoing airway inflammation that results in recurring acute episodes (attacks) of breathing problems such as coughing, wheezing, chest tightness, and shortness of breath. These symptoms occur because the inflammation makes the airways overreact to a variety of stimuli including physical activity, upper respiratory infections,

allergens, and irritants. Exposure to these stimuli often called triggers creates more swelling and blocking of the airways. Asthma episodes can be mild, moderate, or even life threatening. Vigorous exercise will cause symptoms for most students with asthma if their asthma is not well controlled. Some students experience symptoms only when they exercise. However, today's treatments can successfully control asthma so that students can participate fully in physical activities most of the time.

NTIS

Asthma; Chronic Conditions; Lungs

20070013689 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden

Greenhouse Gas Emissions Trading for the Transport Sector

Holmgren, K.; Belhaj, M.; Gode, J.; Sarnholm, E.; Zetterberg, L.; Dec. 2006; 111 pp.; In English

Report No.(s): PB2007-106761; IVL-B-1703; No Copyright; Avail.: National Technical Information Service (NTIS)

In this study we have analysed different options to apply emissions trading for greenhouse gas emissions to the transport sector. The main focus has been on the EU transport sector and the possibility to include it in the current EU ETS in the trading period beginning in 2013. The purpose was to study how different alternatives will affect different actors. Focus has been on three sub sectors; road transport, aviation and shipping. The railway sector has only been treated on a general level.

NTIS

European Union; Exhaust Emission; Exhaust Gases; Greenhouse Effect

20070013694 Abt Associates, Inc., Bethesda, MD, USA

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation

Lehrer, J. A.; Bacou, M.; Blankespoor, B.; McCubbin, D.; Sacks, J.; Jan. 2007; 264 pp.; In English

Report No.(s): PB2007-106630; No Copyright; Avail.: National Technical Information Service (NTIS)

During the last review of the secondary ozone (O₃) NAAQS, as part of the development of the 1996 O₃ Staff Paper (SP), EPA conducted analyses that assessed national O₃ air quality, vegetation exposures and risk, and impacts to economic benefits. At the time of the last review, large rural sections of the country had little or no monitor coverage, including important growing regions for agricultural crops and forested ecosystems. Since O₃ monitor coverage in agricultural and rural/remote sites has changed little since the last review, EPA must again rely on generated O₃ air quality information in non-monitored areas to provide national O₃ exposure coverage. Given a number of recent air quality related developments, EPA has decided to use a different method to generate a national exposure surface in this review. In this report we present analyses of national O₃ air quality, vegetation exposures and risk, and impact to economic benefits that incorporates improved methods for estimating O₃ at unmonitored locations. The authors present quantitative evaluations of these new methods and an application of several such methods to improve upon the results of the 1996 analysis. Ultimately, our purpose is to evaluate the economic benefits associated with several alternative O₃ standards currently under consideration.

NTIS

Air Quality; Damage Assessment; Ozone; Risk; Vegetation; Economic Impact

20070013695 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA

Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling

Mar. 2007; 62 pp.; In English

Report No.(s): PB2007-106629; EPA/454/R-07-004; No Copyright; Avail.: National Technical Information Service (NTIS)

The document describes the air quality modeling performed by EPA in support of the proposed Locomotive/Marine rule. A national scale air quality modeling analysis was performed to estimate the effect of the proposed rule on future year: annual PM(sub 2.5) concentrations, daily maximum 8-hour ozone concentrations, and visibility. To model the air quality benefits of this rule the authors used the Community Multiscale Air Quality (CMAQ)(sup 1) model. CMAQ simulates the numerous physical and chemical processes involved in the formation, transport, and destruction of ozone and particulate matter. In addition to the CMAQ model, the modeling platform includes the emissions, meteorology, and initial and boundary condition data which are inputs to this model.

NTIS

Air Quality; Environment Models; Environment Protection; Multiscale Models; Pollution Transport; Atmospheric Models

Includes Earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see *47 Meteorology and Climatology*; and *93 Space Radiation*.

20070011541 NASA Johnson Space Center, Houston, TX, USA

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector

Westphal, Andrew J.; Bastien, Ronald K.; Borg, Janet; Bridges, John; Brownlee, Donald E.; Burchell, Mark J.; Cheng, Andrew F.; Clark, Benton C.; Djouadi, Zahia; Floss, Christine, et al.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar, 2007, Houston, TX, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NNH04AB49I; NNH06AD67I; W-7405-eng-48; NAG5-10696; Copyright; Avail.: CASI: [A01](#), Hardcopy

In January 2004, the Stardust spacecraft flew through the coma of comet P81/Wild2 at a relative speed of 6.1 km/sec. Cometary dust was collected at in a 0.1 sq m collector consisting of aerogel tiles and aluminum foils. Two years later, the samples successfully returned to earth and were recovered. We report the discovery that impacts in the Stardust cometary collector are not distributed randomly in the collecting media, but appear to be clustered on scales smaller than approx. 10 cm. We also report the discovery of at least two populations of oblique tracks. We evaluated several hypotheses that could explain the observations. No hypothesis was consistent with all the observations, but the preponderance of evidence points toward at least one impact on the central Whipple shield of the spacecraft as the origin of both clustering and low-angle oblique tracks. High-angle oblique tracks unambiguously originate from a noncometary impact on the spacecraft bus just forward of the collector. Here we summarize the observations, and review the evidence for and against three scenarios that we have considered for explaining the impact clustering found on the Stardust aerogel and foil collectors.

Author

Stardust Mission; Aerogels; Samplers; Metal Foils; Aerosols; Accumulators; Comets; Dust

20070011625 NASA Johnson Space Center, Houston, TX, USA, Oceaneering Space Systems, Houston, TX, USA

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter

Cooper, Bonnie L.; [2007]; 2 pp.; In English; Lunar and Planetary Sciences Conference, 11-16 Mar. 2007, League City, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): NNNJ05HI05C; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011625>

Clementine 750 nm and multispectral ratio data, along with Lunar Orbiter and radar data, were used to study the crater Scott in the lunar south polar region. The multispectral data provide evidence for mafic materials, impact melts, anorthositic materials, and a small pyroclastic deposit. High-resolution radar data and Lunar Orbiter photography for this area show differences in color and surface texture that correspond with the locations of the hypothesized mafic and anorthositic areas on the crater floor. This region provides a test case for the upcoming Lunar Reconnaissance Orbiter. Verification of the existence of a mafic deposit at this location is relevant to future lunar resource utilization planning.

Derived from text

Deposits; Lunar Orbiter; Mineralogy; Reconnaissance; Polar Regions

20070011738 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Multisensor Platform Deployment Proposal for International Polar Year (IPY)

Evans, Diane L.; June 28, 2006; 8 pp.; In English; Pac Rim Workshop, 26 Jun. 2006, Kuala Lumpur, Malaysia; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39821>

High resolution thermal surveys will be acquired to quantify the thermal balance of several active, changing volcanoes which are difficult to monitor for change. Maps of the heat flow on these volcanoes will help in understanding the internal processes changing their surfaces. Correlation of heat flow with volcano deformation and seismicity will help in the understanding of this active region. Remote sensing of composition and biology of warm, bare areas will allow a better understanding of these extreme ecosystems. The thermal surveys and ancillary compositional and biological mapping will be used to focus searches on Mars for similar environments. Mars is a polar desert, much like Antarctica, and one of the few places on Mars where life could exist is in a thermal anomaly like the bare, warm ground areas on the Antarctic volcanoes. We will study the factors making these areas habitable and hone the remote sensing techniques that may be used to detect these features

on Mars. Warm areas on Mars (as on the Antarctic volcanoes) are especially hospitable to humans as well, making their discovery on Mars of primary importance for human occupation.

Derived from text

Temperature Measurement; Antarctic Regions; Deployment; Planetary Geology; Remote Sensing; Seismology; Volcanoes

20070012365 NASA Johnson Space Center, Houston, TX, USA

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition

Perronnet, M.; Zolensky, M. E.; Gounelle, M.; Schwandt, C. S.; [2007]; 38 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

carbonaceous chondrites are of the major interest since they contain one of the most primitive organic matters. However, aqueous alteration has more or less overprinted their original features in a way that needed to be assessed. That was done in the present study by comparing the mineralogy of the most altered CR1 chondrite, GRO 95577, to a less altered CR2, Renazzo. Their modal analyses were achieved thanks to a new method, based on X-ray elemental maps acquired on electron microprobe, and on IDL image treatment. It allowed the collection of new data on the composition of Renazzo and confirmed the classification of GRO 95577 as a CR1. New alteration products for CRs, vermiculite and clinocllore, were observed. The homogeneity of the Fe-poor clays in the CR1 and the distinctive matrix composition in the two chondrites suggest a wide-range of aqueous alteration on CRs. The preservation of the outlines of the chondrules in GRO 95577 and the elemental transfers of Al, Fe and Ca throughout the chondrule and of Fe and S from the matrix to the chondrule favor the idea of an asteroidal location of the aqueous alteration. From their mineralogical descriptions and modal abundances, the element repartitions in Renazzo and GRO 95577 were computed. It indicates a possible relationship between these two chondrites via an isochemical alteration process. Knowing the chemical reactions that occurred during the alteration, it was thus possible to decipher the mineralogical modal abundances in the unaltered CR body.

Author

Meteoritic Composition; Carbonaceous Chondrites; Mineralogy; Classifications; Chemical Reactions; Abundance

20070012823 Bath Univ., Bath, UK

3rd IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere System/ Abstract

Pancheva, Dora; Jan 10, 2007; 72 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-06-1-5023

Report No.(s): AD-A462939; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462939>

The Final Proceedings for 3rd IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere 18 September 2006 - 22 September 2006. The 3rd IAGA/ICMA Workshop will focus primarily on those forcing mechanisms that originate in the lower atmosphere on their transmission into the atmosphere-ionosphere system and the ways in which these are influenced by changing solar geomagnetic and anthropogenic drivers. The workshop will address recent studies on atmospheric coupling with special emphasis on the following topics: (i) coupling by mean circulation atmospheric tides and planetary and gravity waves; (ii) coupling by transport of atmospheric constituents and feedback of chemistry on dynamics; (iii) electrodynamic coupling and atmospheric electricity; (iv) modelling utilized for understanding the coupling processes. The workshop aims to stimulate the integration of observations and models to provide physical explanations for and new insights into the range of phenomena that result from coupling and feedbacks in the atmosphere-ionosphere system. The symposium will provide the next opportunity for the international research community to review the progress made so far and suggest some future directions in the investigation of all significant couplings (dynamic and electrodynamic radiative transport and chemistry of atmospheric constituents) trigger mechanisms and feedback processes.

DTIC

Earth Atmosphere; Ionospheres

20070012883 Naval Observatory, Flagstaff, AZ USA

Measuring Night-Sky Brightness With a Wide-Field CCD Camera

Duriscoe, Dan M; Luginbuhl, Christian B; Moore, Chadwick A; Feb 13, 2007; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463050; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463050>

We describe a system for rapidly measuring the brightness of the night sky using a mosaic of CCD images obtained with a low-cost automated system. The portable system produces millions of independent photometric measurements covering the entire sky, enabling the detailed characterization of natural sky conditions and light domes produced by cities. The measurements are calibrated using images of standard stars contained within the raw data, producing results closely tracking the Johnson V astronomical standard. The National Park Service has collected hundreds of data sets at numerous parks since 2001 and is using these data for the protection and monitoring of the night-sky visual resource. This system also allows comprehensive characterization of sky conditions at astronomical observatories. We explore photometric issues raised by the broadband measurement of the complex and variable night-sky spectrum, and potential indices of night-sky quality.

DTIC

Cameras; CCD Cameras; Night Sky; Sky Brightness

20070012975 Defence Science and Technology Agency, Singapore

Leveraging C2IEDM for Enhancing Systems Interoperability

Ong, Andy; Min, Lim Y; Cheung, Lai Y; Jun 2006; 34 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463323; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463323>

The current conduct of operations for peace keeping or disaster relief sees the increasing need for co-operation among different national agencies and nations, to collaborate and to maintain awareness of the status, capabilities, response plans and C2 resources. The urgency and scale of such missions bring forth the need for seamless transition to operation, as well as the need for better interoperability of the respective systems used among the national agencies and the coalition partners. This paper presents the exploration conducted by Defence Science and Technology Agency (DSTA) on enhancing the integration between C2 and IT (such as, human resource and logistic) systems, as well as the interoperability between new and existing/legacy systems. In the exploration, DSTA uses Command and Control Information Exchange Data Model (C2IEDM) as the referential data model for building an information hub, and encapsulated the hub with a set of open-standards based web services. The set of services offered a consistent way of accessing and updating the information hub, while maintaining the hub's integrity by enforcing the business rules defined in C2IEDM. In addition, the set of services also shields web service consumers from the complexity of the model. This paper will discuss on the information integration architecture, challenges encountered and the lessons learnt during the exploration, while putting the state of the art data model into practice.

DTIC

Disasters; Document Markup Languages; Interoperability; Tsunami Waves

20070013303 Naval War Coll., Newport, RI USA

Global-Warming: A National Security Issue

Klug, Andrew J; Feb 13, 2006; 22 pp.; In English

Report No.(s): AD-A463560; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The waters in the Canadian Arctic are quickly becoming free to navigate due to global warming. international shipping bombards the region, the USA and Canada must be ready to face the security implications that will arise. A failure to do so may leave an opening for another terrorist strike on American soil. We must also be prepared to protect our interests in the region. Focus on Arctic oil is becoming a reality as we move towards freeing ourselves from dependence on oil from the Middle East. Preparing for operations in the Arctic must begin with a strong and cooperative relationship with our Canadian neighbors. Differences must be settled quickly particularly the issue over the sovereignty of the Canadian archipelago. We must also understand the implications of operating in the north with respect to the indigenous population and the environment. The success of the operations in the north depends on proactive planning now is the time.

DTIC

Greenhouse Effect; Security

20070013524 NASA Johnson Space Center, Houston, TX, USA

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging

Murchie, S.; Bishop, J.; Humm, D.; Morris, R.; Pelkey, S.; Seelos, F.; Seelos, K.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright;

Avail.: CASI: [A01](#), Hardcopy

Preliminary analysis of CRISM imaging of the Mars Pathfinder landing site is consistent with previously reported results from landed imaging. At tens of meters scale, the surface is largely dust-covered. Lee portions of topographic knobs are

reddest and show most evidence for ferric mineralogy. The nearby 1.5-km diameter 'Big Crater' exposes olivine, which is atypical of the northern plains. Big Crater may have penetrated northern plains material to expose buried basaltic highlands. Derived from text

Craters; Imaging Techniques; Mineralogy; Olivine; Dust; Basalt

METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20070011414 Executive Office of the President, Washington, DC USA

Windstorm Impact Reduction Implementation Plan

Jan 2007; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462533; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The tragedy caused by Hurricanes Katrina and Rita in August and September 2005, the unprecedented hurricane season of 2004 in which five hurricanes made landfall in Florida, and the May 1999 outbreak of damaging tornados in Oklahoma underscore the significant and growing risks to our society due to wind hazards. Public Law 108-360, known as the National Windstorm Reduction Act of 2004, was signed into law by President Bush to reduce the risk wind hazards pose to life and property. Although there are current and ongoing activities related to, or focused on, wind hazards it is clear that these efforts are more often merely small parts of larger efforts and are not coordinated among the agencies. For example, the National Oceanic and Atmospheric Administration (NOAA) makes weather predictions regarding several physical parameters of which wind is only one part; the National Institute of Standards and Technology (NIST) studies structural hazards ranging from earthquakes to fires, and winds are only one component; and the Federal Emergency Management Agency (FEMA) conducts evacuation planning studies, promotes wind preparedness activities, and advocates enhancements to the nations model building codes as part of multi-hazard programs. In accordance with the legislation, a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, will improve the understanding of windstorms and their impact, and develop and encourage implementation of cost-effective mitigation measures to reduce those impacts while promoting community resilience. This working group shall meet at least quarterly, report to the Subcommittee on Disaster Reduction annually and work with state, local officials and non-government organizations as appropriate. All Federal agencies contributing to this document shall be members of the working group and the chair of the working group will rotate between NIST, NSF, NOAA and FEMA with each Agency serving a two-year

DTIC

Storms; Wind (Meteorology)

20070011511 Geological Survey, Reston, VA USA, Agency for International Development, Washington, DC, USA

Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan

Whitney, J. W.; January 2006; 50 pp.; In English

Report No.(s): PB2007-107007; USGS-SIR-2006-5182; No Copyright; Avail.: National Technical Information Service (NTIS)

This report presents an overview of the geology, hydrology, and climate of the lower Helmand Basin, a large, closed, arid basin in southern Afghanistan. The basin is drained by the Helmand River, the only perennial desert stream between the Indus and Tigris-Euphrates Rivers. The Helmand River is the lifeblood of southern Afghanistan and has supported desert civilizations in the Sistan depression for over 6,000 years. The Helmand Basin is a structurally closed basin that began to form during the middle Tertiary as a consequence of the collision of several Gondwanaland fragments. Aeromagnetic studies indicate the basin is 35 kilometers deep over basement rocks. Continued subsidence along basin-bounding faults in Iran and Pakistan throughout the Neogene has formed the Sistan depression in the southwest corner of the basin. Lacustrine, eolian, and fluvial deposits are commonly exposed in the basin and were intruded by latest Miocene-middle Quaternary volcanoes, which indicates that depositional environments in the lower Helmand Basin have not substantially changed for nearly 10 million years.

NTIS

Afghanistan; Geology; Water

20070011524 Pennsylvania Transportation Inst., University Park, PA, USA

Advanced Road Safety and Weather Warning System (ARSAWWS)

Aguero-Valverde, J.; Jovanis, P. P.; Knight, P. G.; Oct. 09, 2006; 34 pp.; In English

Report No.(s): PB2007-105594; PTI-2007-07; No Copyright; Avail.: CASI: A03, Hardcopy

Roadway, traffic volume and crash data were analyzed to identify sites that are good candidates for improvement for weather-related crashes. These sites with promise were then shared with meteorology researchers on the team who used them to explore and identify significant weather-related signatures within meteorological data. These analyses were undertaken to determine the feasibility of an Advanced Road Safety and Weather Warning System, which would provide forecasts of significant weather events that could be broadcast to the public via communications outlets such as highway advisory radio, websites, changeable message signs and direct media broadcasts. The linked analysis of crash and meteorological data was a success. While the specific findings of this particular study are applicable to PennDOT District 2-0, the methodology is applicable to any other PennDOT district with comparable data and extendable to any type of crash under investigation and even to other facility types. This approach can be particularly helpful when analyzing crash types that are relatively infrequent; the use of random effects might provide a means for accounting for random variability.

NTIS

Early Warning Systems; Forecasting; Roads; Safety; Warning Systems

20070011565 Government Accountability Office, Washington, DC, USA

Hurricane Katrina: Allocation and Use of \$2 Billion for Medicaid and Other Health Care Needs

Feb. 2007; 57 pp.; In English

Report No.(s): PB2007-106585; GAO-07-67; No Copyright; Avail.: National Technical Information Service (NTIS)

As of September 30, 2006, CMS allocated \$1.9 billion of the \$2 billion in DRA funding to states. CMS allocated funds to: Category I--the nonfederal share of expenditures for time-limited Medicaid and SCHIP services for eligible individuals affected by the hurricane (32 states); Category II--expenditures for time-limited uncompensated care services for individuals without a method of payment or insurance (8 of the 32 states); and Category III--the nonfederal share of expenditures for existing Medicaid and SCHIP beneficiaries (Alabama, Louisiana, and Mississippi). CMS did not allocate funds to Category IV--for restoration of access to health care. After CMS reconciles states' expenditures with allocations, it will determine how to allocate the unallocated \$136 million and unexpended funds from the \$1.9 billion allocated to states. Of the \$1.9 billion in allocated DRA funds, almost two-thirds of the 32 states that received these funds submitted claims totaling about \$1 billion as of October 2, 2006. Claims from Alabama, Louisiana, and Mississippi for Category III accounted for about 85 percent of all claims filed. These initial results are likely to change as states continue to file claims for services. Of the four selected states, Louisiana and Texas raised concerns about their ability to meet future health care needs once the DRA funds are expended. Louisiana's concerns involved managing its Medicaid program across state borders as those who left the state remain eligible for the program. Texas was significantly affected by the number of evacuees seeking services, thus raising concerns among state officials about the state's future funding needs. CMS, Alabama, Louisiana, and Texas commented on a draft of this report. CMS suggested the report clarify the DRA funding categories, reallocation process, and communication strategy with states, especially Louisiana. Louisiana and Texas commented on their ongoing challenges, and Alabama provided technical comments. The report was revised as appropriate.

NTIS

Disasters; Health; Hurricanes

20070011574 Transportation Research Board, Washington, DC, USA, SRF Consulting Group, Inc., Minneapolis, MN, USA, Braun Intertec Corp., Minneapolis, MN, USA

Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors

Fleege, E. J.; Scott, B.; Minge, E.; Gallagher, M.; Sabie, J.; Jun. 2006; 331 pp.; In English

Report No.(s): PB2007-106740; NCHRP-87; Copyright; Avail.: National Technical Information Service (NTIS)

At least 42 state departments of transportation (DOTs) and other public and private-sector agencies use road weather information systems (RWISs) to support highway-operations and maintenance decision making, public information messages, and weather forecasts by the meteorological community. These agencies typically specify requirements for the accuracy of RWIS atmospheric and pavement surface and subsurface sensor measurements at the time of procurement. Subsequent to the procurement, most agencies rely on vendor-developed testing and calibration methods or accept the sensor data without verification or regular and timely recalibration. However, uncertainty in the data generated by the sensors may compromise the value of this information. Guidance is needed for practical testing and calibration methods for RWIS sensors to ensure that the sensor is providing an accurate representation of actual conditions at the installed site. Methods for atmospheric sensors

applicable to RWISs can be derived from existing literature and practice. Further research is needed to develop testing and calibration methods for RWIS pavement surface and subsurface sensors. The results of this latter research can then be combined with existing methods for atmospheric sensors to provide practical guidelines for field testing and calibrating RWIS sensors. Aurora, a consortium of several USA and Canadian DOTs and the Swedish National Road Administration formed to promote RWIS research and implementation, has investigated the state of the practice for testing and calibrating RWIS pavement surface and subsurface sensors. Their December 1999 report (see Special Note A) indicates that a number of countries and organizations were developing methods and standards for testing and calibrating RWIS sensors. As of 1999, only the Ministère de l'Équipement des Transports et du Logement of France had adopted and implemented guidelines for RWIS testing and calibration.

NTIS

Information Systems; Roads

20070011597 Lawrence Livermore National Lab., Livermore, CA USA

Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory

Clancy, T. J.; Brown, C. G.; Ong, M. M.; Clark, G. A.; Jan. 12, 2006; 6 pp.; In English

Report No.(s): DE2006-894330; UCRL-CONF-218103; No Copyright; Avail.: Department of Energy Information Bridge

Presented here is an innovation in lightning safety certification, and a description of its implementation for high explosives processing and storage facilities at Lawrence Livermore National Laboratory. Lightning rods have proven useful in the protection of wooden structures; however, modern structures made of rebar, concrete, and the like, require fresh thinking. Our process involves a rigorous and unique approach to lightning safety for modern buildings, where the internal voltages and currents are quantified and the risk assessed. To follow are the main technical aspects of lightning protection for modern structures and these methods comply with the requirements of the National Fire Protection Association, the National Electrical Code, and the Department of Energy (1)(2). At the date of this release, we have certified over 70 HE processing and storage cells at our Site 300 facility.

NTIS

Certification; Explosives; Lightning; Protection

20070011674 Alabama Univ., Huntsville, AL, USA, Office of Air Quality Planning and Standards, Research Triangle Park, NC USA

Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI)

Doty, K.; Tesche, T. W.; McNally, D. E.; Timin, B.; Mueller, S. F.; Jul. 2002; 465 pp.; In English

Report No.(s): PB2007-106284; No Copyright; Avail.: National Technical Information Service (NTIS)

Computer-based modeling done as part of an integrated environmental impact assessment sponsored by the Southern Appalachian Mountains Initiative (SAMI) can be classified into four categories: (1) emissions, (2) meteorological, (3) air quality (atmospheric chemistry), and (4) environmental effects. Together this body of work represents an interdisciplinary approach for developing a comprehensive view of the relationships between anthropogenic emissions and the environment of the southern Appalachians as of the mid-1990s. In addition, SAMI is using its modeling system to forecast environmental changes expected to occur in response to alternative future emission scenarios. This report, prepared by contractors to SAMI and a member of the SAMI Atmospheric Modeling Subcommittee, describes the second modeling component that deals with the meteorological state of the atmosphere. Meteorological modeling is necessary to provide certain required inputs to emissions modeling and to describe the state of the atmosphere in which a large number of chemical reactions determine air quality. Meteorology influences the transport and dispersion of pollutants, chemical reaction rates, and the natural (so-called deposition) processes that remove pollutants from the air. Therefore, meteorological modeling is a critical early step in the SAMI integrated assessment.

NTIS

Appalachian Mountains (North America); Atmospheric Models; Meteorology

20070012572 Lawrence Livermore National Lab., Livermore, CA USA

Lightning Protection System for HE Facilities at LLNL-Certification Template

Clancy, T. J.; Ong, M. M.; Brown, C. G.; Jan. 17, 2006; 33 pp.; In English

Report No.(s): DE2006-890612; UCRL-TR-218211; No Copyright; Avail.: Department of Energy Information Bridge

This document is meant as a template to assist in the development of your own lightning certification process. Aside from this introduction and the mock representative name of the building (Building A), this document is nearly identical to a

lightning certification report issued by the Engineering Directorate at Lawrence Livermore National Laboratory. At the date of this release, we have certified over 70 HE processing and storage cells at our Site 300 facilities. In Chapters 1 and 2 respectively, we address the need and methods of lightning certification for HE processing and storage facilities at LLNL. We present the preferred method of lightning protection in Chapter 3, as well as the likely building modifications that are needed to comply with this method. In Chapter 4, we present the threat assessment and resulting safe work areas within a cell. After certification, there may be changes to operations during a lightning alert, and this is discussed in Chapter 5. Chapter 6 lists the maintenance requirements for the continuation of lightning certification status. Appendices of this document are meant as an aid in developing your own certification process, and they include a bonding list, an inventory of measurement equipment, surge suppressors in use at LLNL, an Integrated Work and Safety form (IWS), and a template certification sign-off sheet. The lightning certification process involves more than what is spelled out in this document. The first steps involve considerable planning, the securing of funds, and management and explosives safety buy-in. Permits must be obtained, measurement equipment must be assembled and tested, and engineers and technicians must be trained in their use. cursory building inspections are also recommended, and surge suppression for power systems must be addressed. Upon completion of a certification report and its sign-off by management, additional work is required. Training will be needed in order to educate workers and facility managers of the requirements of lightning certification. Operating procedures will need to be generated and/or modified with additional controls. Engineering controls may also be implemented requiring the modification of cells. Careful planning should bring most of these issues to light, making it clear where this document is helpful and where additional assistance may be necessary.

NTIS

Certification; Illuminating; Lightning; Protection; Templates

20070012581 National Hydrologic Warning Council, Sacramento, CA, USA
Use and Benefits of the National Weather Service River and Flood Forecasts

May 2002; 33 pp.; In English

Report No.(s): PB2007-107237; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The National Weather Service (NWS) through its River and Flood Program, maintains an around-the-clock vigil of rivers throughout the country and issues watches and warnings to protect life and property when the threat of flooding does occur. (Stallings and Wenzel, 1995). When sufficient flood warning time is given to the communities, appropriate actions can be taken to reduce losses. Thus, economic benefits occur that are directly attributable to timely hydrologic forecasts. This report amends the 1997 report entitled The Benefits of Hydrologic Forecasting (Stallings, 1997). The earlier version provided an analysis of flood damages in the USA for a 20-year period and an estimate of annual benefits derived from reduced flood damages by using NWS hydrologic forecasts. Benefits accruing from improved water use and management practices with better forecasts are also described. All estimates in this report have been updated to reflect the latest data. This report also differs from the earlier version by quantifying benefits for specific regions of the USA, thus enabling the NWS to establish priorities for improving hydrologic services and implementing the AHPS (Advanced Hydrologic Prediction Service) nationwide. Another major difference between the two reports is the establishment of an independent review team representing the external user community. Formed under the auspices of the National Hydrologic Warning Council, these individuals are known for their extensive involvement with operational hydrology, early flood detection and local flood warning programs. The importance of partnerships with external users and cooperators is vital to the mission of the NWS.

NTIS

Floods; Forecasting; Rivers

20070012582 National Centers for Environmental Prediction, Silver Spring, MD USA
Service Assessment: Hurricane Katrina, August 23-31, 2005

Jun. 2006; 50 pp.; In English

Report No.(s): PB2007-107238; No Copyright; Avail.: National Technical Information Service (NTIS)

After crossing South Florida and gaining strength over the Gulf of Mexico, the center of Hurricane Katrina made landfall in southeast Louisiana at 6:10 a.m. local time on August 29. Katrina was then a large Category 3 hurricane. with winds of 125 mph and a central pressure of 920 millibars (mb). This makes Katrina the third most intense USA (U.S.) land-falling hurricane on record based on central pressure. Katrinas center moved ashore near the Louisiana and Mississippi border around 9:45 a.m. and continued to move north through Mississippi, maintaining hurricane intensity almost 100 miles inland. Over the next two days, Katrina moved north through the lower Mississippi Valley into the Ohio River Valley region, spreading destructive winds well inland and spawning dozens of tornadoes. The devastation left in Katrinas wake over southeast Louisiana and coastal Mississippi was immense. The storm surge ravaged coastal Mississippi, and several levee breaches occurred in and around

New Orleans. The levee breaches and overtopping resulted in floodwaters of 15 to 20 feet covering about 80 percent of the city. The catastrophic damage and loss of life inflicted by this hurricane is staggering, with an estimated 1,353 direct fatalities and 275,000 homes damaged or destroyed. According to the American Insurance Services Group, Katrina caused an estimated \$40.6 billion in insured losses (as of June 2006). The National Hurricane Center (NHC) typically doubles the estimated insured losses for an estimate of total damage losses in the U.S., giving an estimated total \$81.2 billion in damage. Total economic losses could be greater than \$100 billion. These impacts make Katrina the costliest hurricane in U.S. history and one of the five deadliest hurricanes to ever strike the U.S. Tens of thousands of jobs were lost due to severely damaged or destroyed businesses and supporting infrastructure. Major highways in and around New Orleans were damaged or destroyed, disrupting commerce. Katrina also affected the oil and gas industry by damaging platforms and shutting down refineries, and interrupted operations at two major U.S. ports in Louisiana. While NWS offices were heavily engaged in forecast and warning operations during Katrina, the impacts of the storm created extremely challenging working and living conditions. Katrina caused significant disruptions in the communication infrastructure in southeast Louisiana. As a result, the NWS offices in Louisiana and Mississippi experienced communications outages affecting their ability to monitor weather conditions and disseminate forecasts, warnings, and information. Continuity of operations plans (COOP) were implemented for each of the impacted NWS offices in Louisiana and Mississippi. Under these plans, NWS offices from Texas to Florida were involved in providing the necessary backup services.

NTIS

Evaluation; Hurricanes; Performance Tests

20070012591 National Climatic Data Center, Asheville, NC, USA

NOAA's National Climatic Data Center Annual Report, 2005

January 2005; 28 pp.; In English

Report No.(s): PB2007-107236; No Copyright; Avail.: National Technical Information Service (NTIS)

The National Oceanic and Atmospheric Administrations (NOAAs) National Climatic Data Centers (NCDCs) Annual Report focuses on the activities and accomplishments at NCDC during 2005. In collaboration with our partners, both internal and external to NOAA, I am pleased to report that NCDC met or exceeded all its performance measures, sometimes surpassing them by a considerable margin. Each year we embrace the challenge to provide our broad-base of users with climate data and information products of the highest-quality. Our mission is to provide access and stewardship to the Nations resource of global climate and weather related data and information, and assess and monitor climate variation and change.

NTIS

Climatology; Climate Change; Climate; Libraries

20070012794 Naval Postgraduate School, Monterey, CA USA

Ocean Mixed Layer Response to Gap Wind Scenarios

Konstantinou, Nikolaos; Dec 2006; 81 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462630; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462630>

This study focuses on understanding the oceanic response to gap outflow and the air-sea interaction processes during the gap wind event between 26 and 28 February 2004 over the Gulf of Tehuantepec, Mexico. The U.S. Navy's Coupled Ocean Atmospheric Mesoscale Prediction System (COAMPS) and NPS Ocean Mixed Layer (OML) model was used to simulate the gap wind event and the temporal/spatial evolution of ocean response. Satellites, coincident in situ aircraft and AXBTs measurements of the sea surface temperature and the water temperature profiles collected during the Gulf of Tehuantepec Experiment (GOTEX) were used to define model initial conditions and aid the analysis of model results. Results from the OML simulations suggest measurable SST evolution as a result of the enhanced upper ocean mixing along the jet axes. Model sensitivity tests show the dominant effects of surface heat flux in generating upper ocean mixing while mechanical forcing by the strong wind of the gap outflow has secondary effects. Sensitivity tests also suggest that the thermocline structure is the most important factor in determining the magnitude of the ocean response while variations in SST are not sensitive to upwelling for a short time scale of several days. The study of COAMPS/OML simulations and satellite (SST) images confirm the existence of a secondary gap outflow source in the area.

DTIC

Air Water Interactions; Gulf of Mexico; Oceans; Wind (Meteorology)

20070013202 Naval War Coll., Newport, RI USA

Owning the Weather in the Maritime Environment

Angove, Michael; May 17, 2005; 26 pp.; In English

Report No.(s): AD-A463299; No Copyright; Avail.: CASI: [A03](#), Hardcopy

There is a long history of weather impacting military operations. Today's U.S. Joint Forces must incorporate a thorough understanding of the battlespace environment into plans and execution in order to optimize the current generation of high-tech weapons and sensors. The Air Force, Army and Marine Corps place a high value on effectively working knowledge of the environment into all aspects of military operations. For largely cultural reasons the Navy continues to view weather more as a potential hazard, or limit to operations rather than as actionable force-multiplying intelligence. This is a potential problem for the Joint Force Maritime Component Commander (JFMCC) working with limited resources against an enemy seeking to exploit asymmetric advantages (e.g., weather, terrain). A strategy for better incorporating weather into Maritime Operations and Plans through both organizational changes within the JFMCC, and adopting a philosophy of accountability regarding the integration of plans and forecasts is suggested.

DTIC

Military Operations; Weather

20070013288 Naval War Coll., Newport, RI USA

Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations

Morris, Timothy R; May 16, 2006; 25 pp.; In English

Report No.(s): AD-A463517; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Recent disasters, such as Hurricane Katrina and 9-11, have highlighted an increasing need for the U.S. Government (USG) to deliver a more rapid and coordinated response to both natural disasters and classic military response scenarios. Katrina highlighted deficiencies at the national, state and local levels in planning for and executing relief operations. The aftermath of Katrina demonstrated that, within the USG, the DOD possesses unique capabilities to plan for and command and control operations of the magnitude of Katrina. While Federal agencies, such as DHS, are working to improve their responsiveness and develop capabilities to lead these operations in the future, USNORTHCOM has a command element that can provide near term capabilities for the USG. This paper recommends that Standing Joint Force Headquarters North (SJFHQ-N) be utilized to lead planning and training with federal, state, and local agencies to identify and resolve Command and Control (C2) issues that impact mission accomplishment during National Disaster Response Operations. The recommendation provide the USG with a near term capability to solve a major operational deficiency and simultaneously could facilitate excellent planning and training for USNORTHCOM to prepare for its role in Homeland Defense, particularly response to a major terrorist attack requiring a massive USG response.

DTIC

Disasters; Emergencies; Hurricanes; Management Methods; Responses

20070013596 National Defense Univ., Washington, DC USA

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief

Epperly, John M; Jan 2007; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463072; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The purpose of this case study is to facilitate an analysis of the role and effects of network-centric operations during the National Guard's initial response to Hurricane Katrina, which made landfall in Louisiana on August 29, 2005. The study explores the problem of establishing a hastily formed network during a complex humanitarian disaster scenario by focusing on the difficulties of establishing a network at the rifle battalion level during Operation Vigilant Relief. In particular, the study focuses on those operations along the Mississippi Gulf Coast between September 6 and October 1, 2005 conducted by the Virginia Army National Guard's 2nd Battalion, 116th Infantry, part of the 1st Brigade Combat Team of the 29th Infantry Division (Light). The 2-116th Infantry was designated as Task Force (TF) Stonewall prior to its deployment to Mississippi. A sister National Guard task force from Virginia designated TF Cardinal was deployed simultaneously to the Louisiana area of operations (AO). While both units eventually established operational networks, the initial stages offer valuable lessons on what to expect during a complex humanitarian disaster (CHD), especially in terms of communications networks and the attendant effect on continuity of operations. By reviewing the case study, future policymakers as well as civilian and military

leadership will have a better frame of reference for solving communication problems encountered during a CHD and also potential solutions for similar incidents.

DTIC

Armed Forces (United States); Communication Networks; Deployment; Disasters; Emergencies; Hurricanes; Management Methods; Responses; Warfare

20070013720 NASA Marshall Space Flight Center, Huntsville, AL, USA

Challenges to modeling the Sun-Earth System: A Workshop Summary

Spann, James F.; [2006]; ISSN 1364-6826; 2 pp.; In English; Copyright; Avail.: Other Sources

This special issue of the Journal of Atmospheric and Solar-Terrestrial Physics is a compilation of 23 papers presented at The 2004 Huntsville Modeling Workshop: Challenges to Modeling the Sun-Earth System held in Huntsville, AL on October 18-22, 2004. The title of the workshop appropriately captures the theme of what was presented and discussed by the 120 participants. Currently, end-to-end modeling of the Sun-Earth system is a major goal of the National Space Weather and NASA living with a star (LWS) programs. While profound advances have been made in modeling isolated regions of the Sun-Earth system, minimal progress has been achieved in modeling the end-to-end system. The transfer of mass, energy and momentum through the coupled Sun-Earth system spans a wide range of scales in time and space. The uncertainty in the underlying physics responsible for coupling contiguous regions of the Sun-Earth system is recognized as a significant barrier to progress. Derived from text

Sun; Climate Models; Solar Activity; Solar Activity Effects; Solar Terrestrial Interactions

20070013737 NASA Marshall Space Flight Center, Huntsville, AL, USA

Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System

Case, Jonathan L.; LaCasse, Katherine M.; Santanello, Joseph A., Jr.; Lapenta, William M.; Petars-Lidard, Christa D.; January 18, 2007; 1 pp.; In English; 87th Annual Meeting: 21st Conference on Hydrology, 14-18 Jan. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

The exchange of energy and moisture between the Earth's surface and the atmospheric boundary layer plays a critical role in many hydrometeorological processes. Accurate and high-resolution representations of surface properties such as sea-surface temperature (SST), vegetation, soil temperature and moisture content, and ground fluxes are necessary to better understand the Earth-atmosphere interactions and improve numerical predictions of weather and climate phenomena. The NASA/NWS Short-term Prediction Research and Transition (SPORT) Center is currently investigating the potential benefits of assimilating high-resolution datasets derived from the NASA moderate resolution imaging spectroradiometer (MODIS) instruments using the Weather Research and Forecasting (WRF) model and the Goddard Space Flight Center Land Information System (LIS). The LIS is a software framework that integrates satellite and ground-based observational and modeled data along with multiple land surface models (LSMs) and advanced computing tools to accurately characterize land surface states and fluxes. The LIS can be run uncoupled to provide a high-resolution land surface initial condition, and can also be run in a coupled mode with WRF to integrate surface and soil quantities using any of the LSMs available in LIS. The LIS also includes the ability to optimize the initialization of surface and soil variables by tuning the spin-up time period and atmospheric forcing parameters, which cannot be done in the standard WRF. Among the datasets available from MODIS, a leaf-area index field and composite SST analysis are used to improve the lower boundary and initial conditions to the LIS/WRF coupled model over both land and water. Experiments will be conducted to measure the potential benefits from using the coupled LIS/WRF model over the Florida peninsula during May 2004. This month experienced relatively benign weather conditions, which will allow the experiments to focus on the local and mesoscale impacts of the high-resolution MODIS datasets and optimized soil and surface initial conditions. Follow-on experiments will examine the utility of such an optimized WRF configuration for more complex weather scenarios such as convective initiation. This paper will provide an overview of the experiment design and present preliminary results from selected cases in May 2004.

Author

Air Land Interactions; Weather Forecasting; Information Systems; Experiment Design; Hydrometeorology; Atmospheric Models

48
OCEANOGRAPHY

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics; and marine resources. For related information see also *43 Earth Resources and Remote Sensing*.

20070011733 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Towards Mapping the Ocean Surface Topography at 1 km Resolution

Fu, Lee-Lueng; Rodriquez, Ernesto; March 13, 2006; 9 pp.; In English; 15 Years Progress in Radar Altimetry, 13-18 Mar. 2006, Venice, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39826>

We propose to apply the technique of synthetic aperture radar interferometry to the measurement of ocean surface topography at spatial resolution approaching 1 km. The measurement will have wide ranging applications in oceanography, hydrology, and marine geophysics. The oceanographic and related societal applications are briefly discussed in the paper. To meet the requirements for oceanographic applications, the instrument must be flown in an orbit with proper sampling of ocean tides.

Author

Ocean Surface; Topography; Radar Measurement; Synthetic Aperture Radar; Geophysics; Oceanography; Rangefinding

51
LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

20070011408 Defence Research and Development Canada, Ottawa, Ontario Canada

Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event

Stodilka, Robert Z; Wilkinson, Diana; Sep 2006; 69 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W7714-5-0958

Report No.(s): AD-A462879; DRDC-ONTARIO-TM-2006-237; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Substantial effort has been placed into enhancing federal capabilities for responding to a Chemical, Biological, Radiological, or Nuclear (CBRN) terrorist attack. However, little emphasis has been placed on including the local-level medical responders in these efforts. In effecting response to a radiological incident, potentially useful resources to access are health care professionals with training in matters of ionizing radiation, namely: nuclear medicine physicians, radiologists, radiation oncologists, medical physicists, and technologists. In this report, we focus on Nuclear Medicine expertise in Canada, and place this expertise into the context of assisting with a radiological terrorist incident. Nuclear Medicine expertise, along with its supporting infrastructure has already been deployed in proportion to the distribution of the civilian population. Given the expectations that the civilian population places in these health care professionals, their immediate access to specialized equipment, and the delay between a radiological terrorist incident and the arrival of federal expert capabilities, it is likely that these health care professionals will play important roles in emergency response. These roles will likely be: identifying the nature of the incident, triage, decontamination, coordinating with First Responders, and communicating with the media. Acknowledging the potential value of these professionals in responding to a radiological terrorist incident, steps should be taken to enlist their support and integrate them into a coherent national strategy.

DTIC

Nuclear Medicine; Radiology; Terrorism

20070011453 Hutchinson (Fred) Cancer Research Center, Seattle, WA USA

Targeting Mechanisms of Resistance to Taxane-Based Chemotherapy

Huang, Chung-Yung; Sep 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0566

Report No.(s): AD-A462817; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Patients with high-risk localized prostate cancer have a high recurrence rate following primary therapy. Neoadjuvant chemotherapy has been shown to be beneficial in reducing recurrence rates in some tumor types, but has yet to be of proven benefit in prostate cancer. Further, current clinical, pathological and molecular markers poorly predict the response and

resistance of chemotherapy, and the molecular mechanisms of chemotherapy resistance are largely unknown. We utilized tissue resources from a unique prospective phase II clinical trial of neoadjuvant chemotherapy with docetaxel and mitoxantrone in patients with high-risk localized prostate cancer to identify molecular alterations after chemotherapy, and correlated these alterations with clinical and pathological indicators of tumor response. We hypothesized that this approach may identify molecular signatures of chemotherapy resistance and uncover mechanisms or pathways suitable for targeting with the objective of improving tumor responses to chemotherapy. Gene expression changes after chemotherapy were measured in 31 patients who completed 4 cycles of docetaxel and mitoxantrone neoadjuvant chemotherapy. After excluding possible ischemia-related genes, the expression of 53 genes were significantly altered after chemotherapy. Several cytokines were significantly up-regulated including IL-8, CCL2, GDF15, CXCL10, and IL1B. Overexpression of GDF15 or treatment with GDF15 protein in DU145 cells conferred resistance to docetaxel and mitoxantrone. Using PSA decline greater than 40% as a cut-point to distinguish good from poor responders, we were able to identify 33 significantly-altered genes. IL8 was not only shown to be activated after chemotherapy but also have higher expression levels in the group of poor responders compared with good responders. Alterations of molecular signatures after administration of docetaxel and mitoxantrone in patients with high-risk localized prostate cancer were recognized.

DTIC

Chemotherapy; Therapy; Gene Expression

20070011461 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets

Philippens, I. H. C. H. M.; Vanwersch, R. A. P.; Jongasma, M. J.; Bouwman, B. M.; Busker, R. W.; October 2006; 7 pp.; In Dutch

Contract(s)/Grant(s): V039; TNO Proj. 014.12840

Report No.(s): TNO-DV-2006-A269; TD2006-0057; Copyright; Avail.: Other Sources

The marmoset monkey model was validated using electroencephalogram -EEG- measurements for evaluating effects on sleep quality. In order to test whether the proposed hypnotics affect the quality of sleep and disrupt the normal sleep architecture, the effects of the short acting hypnotics temazepam, zolpidem and zaleplon on sleep were determined. The results showed that the marmoset monkey model is a valid model for the research of sleep. Furthermore, no large differences between the effects of the tested sleep inducing drugs on the quality of sleep could be observed. All drugs tended to affect the quality of sleep in a positive way. However, all drugs, temazepam especially, resulted in some carry-over effects, i.e. after awakening animals tended to fall asleep again. On the other hand, after temazepam sleep spindles were observed often. These spindles lower the chance of awakening as a result of sensory input like noise. On the other hand, zaleplon and zolpidem induced some rebound-effects. Furthermore, there are some indications that zolpidem has unwanted effects in women. This might indicate that for the management of sleep in a military setting the sleep inducing drugs temazepam and zaleplon might both be useful, with the preference for temazepam

Author

Alertness; Drugs; Monkeys; Sleep

20070011686 National Center for Infectious Diseases, Atlanta, GA, USA

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006

Brandt, M.; Brown, C.; Burkhart, J.; Burton, N.; Cox-Ganser, J.; Jun. 09, 2006; 36 pp.; In English

Report No.(s): PB2007-106404; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Extensive water damage after major hurricanes and floods increases the likelihood of mold contamination in buildings. This report provides information on how to limit exposure to mold and how to identify and prevent mold-related health effects. Where uncertainties in scientific knowledge exist, practical applications designed to be protective of a person's health are presented. Evidence is included about assessing exposure, clean-up and prevention, personal protective equipment, health effects, and public health strategies and recommendations. The recommendations assume that, in the aftermath of major hurricanes or floods, buildings wet for more than 48 hours will generally support visible and extensive mold growth and should be remediated, and excessive exposure to mold-contaminated materials can cause adverse health effects in susceptible persons regardless of the type of mold or the extent of contamination. For the majority of persons, undisturbed mold is not a substantial health hazard. Mold is a greater hazard for persons with conditions such as impaired host defenses or mold allergies. To prevent exposure that could result in adverse health effects from disturbed mold, persons should (1) avoid areas where mold

contamination is obvious; (2) use environmental controls; (3) use personal protective equipment; and (4) keep hands, skin, and clothing clean and free from mold-contaminated dust.

NTIS

Buildings; Mortality; Prevention; Contamination; Public Health; Fungi

20070012805 Texas Univ. Health Science Center, San Antonio, TX USA

Amplification of Type II Cadherins in Prostate Cancer

Johnson-Pais, Teresa L; Nov 2006; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0090

Report No.(s): AD-A462675; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462675>

Genomic alterations of chromosome 18q have been observed in prostate cancer. This research focuses on analyzing the role of increased gene copy number at chromosome 18q22.1 in prostate cancer. We believe the key genes in this region are the type II cadherins. We are studying the role of overexpression of these genes, particularly cadherin 7 (CDH7), on the tumorigenic and invasive potential of prostate cancer cells. We have shown the minimal region of increased copy number contains CDH7. This increased copy number of CDH7 is specific to prostate cancer and is not found in other common cancers. The increased copy number of CDH7 also results in increased levels of cadherin-7 mRNA in prostate tumors. We are purifying polyclonal antibodies against cadherin-7 to use in immunohistochemistry experiments to determine if increased CDH7 copies results in increased levels of protein. We performed knockdown experiments of the cadherin-7 mRNA in a prostate cancer cell line and are analyzing the cadherin-7 protein levels in these cells. We will subsequently evaluate these cells with reduced cadherin-7 expression for their invasive and tumorigenic potential.

DTIC

Amplification; Antibodies; Cancer; Chromosomes; Prostate Gland; Proteins

20070012808 Mount Sinai School of Medicine, New York, NY USA

Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research

Bovbjerg, Dana H; Ambrosone, Christine; Valdimarsdottir, Heiddis; Jandorf, Lina; McGovern, Margaret; Godbold, Jim; Oct 2006; 45 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0334

Report No.(s): AD-A462719; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462719>

The Behavioral Center has three primary Objectives: 1) To support an integrated, interdisciplinary Program of Research consisting of three synergistic Research Projects each of which addresses an important issue in breast cancer genetic research with African American women that entails critical psychological or behavioral issues. Thus, our first purpose is to do outstanding research, with implications for our understanding of the etiology of breast cancer, as well as for our understanding of behavior per se. 2) To encourage the development of truly interdisciplinary thinking among the faculty involved in the Program of Research that can serve as a model for other institutions. Thus, our second purpose is to show by example, not only the utility of an interdisciplinary approach (synergy with Objective 1), but one approach that may facilitate its achievement - working together on an integrated project that addresses important issues of interest to all members of the research team. We propose to bridge the gap between biobehavioral research and epidemiologic approaches. 3) To facilitate the development of truly interdisciplinary perspectives among new investigators in breast cancer research. Thus, our third purpose is to provide both interdisciplinary training through both didactic and hands-on (synergy with Objective 1) research, as well as informal seminars (synergy with Objective 2) to outstanding young investigators likely to represent the future of the field.

DTIC

Breast; Cancer; Genetics; Mammary Glands; Medical Science

20070012810 Iowa Univ., Iowa City, IA USA

Vaccine Immunotherapy for Prostate Cancer

Lubaroff, David; Jul 2006; 100 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0462

Report No.(s): AD-A462829; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462829>

The goal of this Clinical Trial Developmental Award (CTDA) was to develop and complete the required administrative tasks necessary to begin a Phase II clinical trial of an adenovirus/PSA (Ad/PSA) vaccine in men with recurrent prostate cancer and a Phase I clinical trial of the combination of the Ad/PSA vaccine along with immunostimulatory CpG ODN. The tasks included the design and construction of the clinical protocols, informed consent forms, submission to the institutional committees that include the Protocol Review and Monitoring Committee, Human Subjects Committee (IRB), Biosafety Committee, Pharmacy and Therapeutics Committee; the NIH Recombinant DNA Advisory Committee (RAC), and the food and Drug Administration (FDA). In addition, although not funded by the CTDA, we were required by the FDA to perform Pharmacology/Toxicology and Histopathology Studies and to obtain a complete DNA sequence of the Ad/PSA vaccine.

DTIC

Cancer; Prostate Gland; Vaccines

20070012811 Baltimore Research and Education Foundation, Inc., Baltimore, MD USA

Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods

Rohwer, Robert G; Gregori, Luisa L; Sep 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0756

Report No.(s): AD-A462905; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462905>

The focus of this program is the development of a pre-clinical blood-based TSE diagnostic. The assay is been developed with plasma from hamsters infected with the 263K strain of scrapie. The assay has shown high sensitivity and specificity and good reproducibility. In this funding period we addressed two critical issues: Proteinase K (PK) digestion to discriminate PrPc, the normal form of the protein and PrPres the infection-specific form of the protein and denaturation of PrPres in plasma. The first issue was partially resolved when we discovered that PK digestion of plasma PrPc can be conducted without addition of SDS. We can now titer plasma and determine which PK condition is appropriate to digests all PrPc and no infectivity. We also identified the condition for plasma PrPres denaturation. We are currently developing the reagents and protocols for a proof of principle titration in plasma after PK digestion. This is the last step in the development of a complete plasma diagnostic assay. In a large, long term, limiting dilution titration of untreated, whole urine from scrapie infected hamsters, we have now conclusively shown that urine from TSE infected animals contains significant levels of infectivity and we will have a precise titer in another 6 months. Urine could thereby be an alternative substrate for disease detection. Bladder and kidney are also infectious.

DTIC

Assaying; Blood; Enzymes; Urine; Viral Diseases

20070012812 Burnham Inst., La Jolla, CA USA

Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer

Pasquale, Elena B; Nov 2006; 16 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0077

Report No.(s): AD-A462906; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462906>

Mutations have been recently identified in the EphB2 receptor gene in prostate cancer suggesting that EphB2, a member of the large Eph receptor tyrosine kinase family, is a tumor suppressor in prostate cancer. Consistent with a tumor suppressor activity, we found that EphB2 is more highly expressed in non-transformed BPH-1 prostate epithelial cells than in several prostate cancer cell lines. Furthermore, EphB2 expression was rapidly lost in stably transfected DU145 prostate cancer cells, suggesting that EphB2 inhibits cell growth and/or survival. We plan to further examine the effects of EphB2 signaling on the behavior of cancer cells in tissue culture and on prostate cancer progression in a mouse xenograft model. We will also examine whether other Eph receptors that we have detected in prostate cancer cells have effects similar to EphB2. The information obtained from these studies will help guide the design of appropriate treatment strategies and determine if prostate cancers should be screened for Eph receptor and ephrin ligand expression for prognostic purposes.

DTIC

Cancer; Epithelium; Prostate Gland; Suppressors; Tumors

20070012813 Delaware Univ., Newark, DE USA

Function of Perlecan Domain 1 in Prostate Cancer

Zhang, Chu; Farach-Carson, Mary C; Oct 2006; 23 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0919

Report No.(s): AD-A462907; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462907>

Preferential metastasis of prostate cancer (PCa) to bone marrow contributes to disease mortality and morbidity. Local factors present in the bone stromal extracellular matrix (ECM) increase metastatic tumor growth through paracrine interactions among tumor, stromal and endothelial cells present in the microenvironment. Heparin binding growth factors (HBGF) present in bone marrow provide growth and survival signals to metastatic PCa cells. Perlecan (Pln), the major heparan sulfate proteoglycan (HSPG) in the bone marrow stromal ECM functions as a co-receptor to deliver HBGFs to high affinity receptors. HS chains on Pln are located in a unique N-terminal domain I (PlnDI) which serves as a co-receptor for HBGFs. We hypothesized that Pln, specifically PlnDI, delivers HBGFs to the PCa cell surface, promotes cell survival and protects from apoptosis. We used three PCa cell lines: LNCaP, C4-2B, and PC3 to study the function of PlnDI. We harvested conditioned medium (CM) from bone stromal cell lines, HS27a and HS5, which produce abundant Pln. The proteoglycan rich fraction containing Pln was obtained using anion exchange bead chromatography, then tested as a survival factor for the three different PCa cell lines. DNA fragmentation experiments showed that bone stromal derived Pln from CM protected all three lines of PCa cells from camptothecin induced apoptosis. We also supplied purified, fully glycosylated recombinant PlnDI protein to PCa cells, which also protected cells from apoptosis. Pln knockdown clones grow poorly compared to the parental or control transfected C4-2B cells (Ref.1). Interestingly, knockdown cells were more susceptible to apoptosis in response to the apoptosis inducers anti-Fas and camptothecin, and exogenous PlnDI rescued survival. We followed this up by undertaking to identify natural factor(s) produced by bone marrow stromal cells that induces apoptosis in PCa cells. We found that this apoptosis inducing activity is specific for LNCaP derived lines.

DTIC

Bone Marrow; Cancer; Prostate Gland

20070012814 Mount Sinai School of Medicine, New York, NY USA

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy

Hall, Simmon J; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0147

Report No.(s): AD-A462909; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462909>

Introduction: Vesicular Stomatitis Virus (VSV) infection of malignant cells results in oncolysis, sparing normal cells due to inherent differences in the interferon response pathway. In this study we explored enhancing VSV-G by engineering it to express the fusogenic glycoprotein from the Newcastle Disease Virus (VSV-F) to induce inter-cellular membrane fusion producing syncytia, which are incompatible with cell survival. Materials and Methods: Studies initially compared effects of VSV and VSV-F in vitro in prostate cancer cell lines, noting differential effects at different cell densities and the induction of apoptosis. Studies then compared effects of VSV vs VSV-F in a orthoptic mouse model of prostate cancer, focusing on tumor size at set time points and survival. Results: As the confluence of cells in the wells became greater, VSV-F showed more rapid cell kill than VSV-G (p<0.001). VSV-G mediated growth suppression by inducing apoptosis; this effect was slightly attenuated in VSV-F. In both single and serial viral injections VSV-F resulted in significant survival enhancement over control and VSV-G. Interestingly, Repetitive injections of VSV-G was no better than a single injection. Mechanistic studies suggested that some prostate cancer cell lines do not have as attenuated IFN response pathways, which can be overcome by the high levels of IFN found within injected tumors. Discussion: Through the induction of the fusogenic protein, VSV-F maintains superior growth control of only moderately IFN responsive cell lines, most likely through an induced immune response.

DTIC

Cancer; Construction; Infectious Diseases; Prostate Gland; Proteins; Therapy; Viruses

20070012824 Northwestern Univ., Evanston, IL USA

Constitutive Activation of NF-kappaB in Prostate Carcinoma Cells Through a Positive Feedback Loop: Implication of Inducible IKK-Related Kinase (IKKi)

Budunova, Irina V; Aug 2006; 32 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0522

Report No.(s): AD-A462944; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462944>

The overall goal of this project is to understand the role of inducible IKK-related kinase IKKi in constitutive activation of anti-apoptotic transcription factor NF-kappaB prostate carcinoma (PC) cells. During FY03 we developed the optimal conditions for prostate cell PC cell stable infection by lentiviruses; regimens for selection of infected cells; and enrichment of cells co-infected with yellow fluorescent protein (YFP) by FACS. We also developed a test for monitoring of growth of live cell cultures infected with YFP using fluorescent plate reader. We continued the development of the conditions for IKKi immunoprecipitation to reveal the content of IKKi native complexes in PC cells. We assessed the biological effect of IKKi on prostate carcinoma cells. We found that IKKi in LNCaP prostate cells significantly increased their growth in vitro, increased their tumorigenicity. Our experiments indicated that IKKi affected the transcriptional activity of androgen receptor. These results suggest an important role of IKKi in the transition of prostate cells to androgen-independent growth. The results of our studies have been presented at the local and national meetings, one manuscript has been published, one is in press, one is under revision, and fourth is under preparation.

DTIC

Cancer; Positive Feedback; Prostate Gland

20070012836 California Univ., San Francisco, CA USA

A Morpholino Strategy to Assess TSC Gene Function in Zebrafish

Baraban, Scott C; Nov 2006; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0094

Report No.(s): AD-A462962; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462962>

Tuberous sclerosis complex (TSC) is a genetic disorder associated with severe neurological symptoms including mental retardation, autism, infantile spasms, and epilepsy. Seizures occur in the majority of TSC patients and are often refractory to antiepileptic drugs. Cortical tubers, the primary neuropathology in these patients, were identified as epileptogenic in several clinical studies. However, the contribution of TSC gene inactivation to altered excitability (in the absence of tuber formation) is not fully understood. Here we used antisense morpholino oligonucleotides to knockdown TSC genes in developing zebrafish (*Danio rerio*). Using intact agar-immobilized zebrafish larvae and extracellular recording techniques, we present evidence for neuronal hyperexcitability following loss of Tsc1. Importantly, Tsc1 morphants show no evidence of tuber formation in histological studies. In addition, rapamycin effectively inhibited target of rapamycin (TOR) kinase activity in zebrafish with no amelioration of the hyperexcitable phenotype. Our study demonstrates that Tsc1 knockdown in a relatively simple brain structure can result in hyperexcitability.

DTIC

Convulsions; Genes; Neurology; Oligonucleotides

20070012843 California Inst. of Tech., Pasadena, CA USA

Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software

Doyle, John C; Hucka, Michael; Oct 2006; 77 pp.; In English

Contract(s)/Grant(s): F30602-01-2-0558; Proj-BIOC

Report No.(s): AD-A462969; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462969>

The objective of the research is to develop mathematical and software infrastructure in support of post-genomics research in systems biology. One objective articulated in this effort centers on a deeper understanding of the organizational principles of biological networks. A distinguishing theme of this work is its focus on scalable methods of robustness and model validation and invalidation with data, as opposed to relying purely on simulation. The Systems Biology Markup Language (SBML) project is a machine-readable exchange language for computational models of biochemical networks. LibSBML, an embedded software library for SBML, was developed, providing an application programming interface for working with SBML. The LibSBML library provides an interface for working with SBML in a number of programming languages: C, C++, Java, Perl,

MATLAB, Lisp, and Python. It is free, open-source, and portable to Linux, Windows, MacOS and Solaris. The effort led to (1) continued development of LibSBML, (increased support of SBML features and added functionality); and (2) supported SBML use and evolution (direct support for DARPA Bio-SPICE).

DTIC

Biochemistry; Networks; Simulation

20070012848 Dana Farber Cancer Inst., Boston, MA USA

MPD in Telomerase Null Mice

Wong, Kwok-Kin; Sep 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0534

Report No.(s): AD-A462976; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462976>

Recent work over the past year from our laboratory has forged an intimate link between a common age-associated hematopoietic disorder, MPD, and telomere dysfunction in aging telomere dysfunctional mTerc null mice. This finding is particularly notable because one might expect telomere dysfunctional mice to exhibit complete bone marrow failure, rather than the selective expansion and loss of particular hematopoietic lineages. Over the past year we have solidified our initial observations, which include an age- and telomere dysfunction associated peripheral blood red cell anemia, neutrophilia, and thrombocytopenia. These alterations were accompanied by substantial increases in plasma erythropoietin and several inflammatory cytokines, notably IL-6. These alterations in peripheral blood were accompanied by substantial changes elsewhere in the hematopoietic system. In the spleen we noted extensive extramedullary hematopoiesis and splenomegaly, and subsequent loss of lymphoid follicles and replacement by granulocytic lineages. Finally, in the bone marrow, we noted hypercellular bone marrows primarily made up of developing granulocytic lineages with a corresponding loss of developing erythroid and lymphoid lineages. In total, these phenotypes are reminiscent of myeloproliferative disorders (MPDs) that increase in incidence in elderly humans, and thus telomere dysfunctional mTerc null mice may represent a good model system to understand these age-related pathologies. We have initiated quantification and purification of hematopoietic stem cells (HSC) from these mutant mice and also initiated short term transplantation experiments.

DTIC

Anemias; Blood Cells; Bone Marrow; Diseases; Erythrocytes; Hematopoietic System; Mice

20070012849 Colorado Univ., Denver, CO USA

Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer

Crawford, E D; Oct 2006; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0858

Report No.(s): AD-A462977; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462977>

In this study, the metabolic profiles of expressed prostatic secretions (EPS) from 52 men with prostate cancer (PCa) and from 26 healthy controls were analyzed using quantitative proton nuclear magnetic resonance spectroscopy (¹H-NMRS). The metabolites quantified included citrate, spermine, myo-inositol, lactate, alanine, phosphocholine, glutamine, acetate, and hydroxybutyrate. Logistic regression (LR) was used to model the risk of PCa based on metabolite concentrations while adjusting for age. The LR models indicated that the absolute concentrations of citrate, myo-inositol, and spermine were highly predictive of PCa and inversely related to the risk of PCa. The areas under the receiver operating characteristic curves (AUROC) for citrate, myo-inositol and spermine were 0.89, 0.87, and 0.79, respectively. At 90% sensitivity, these metabolites had specificities of 74%, 51% and 34%, respectively. The LR analysis indicated that absolute levels of these three metabolites were independent of age. The results indicate that citrate, myo-inositol and spermine are potentially important markers of PCa in human EPS. Further, the absolute concentration of these metabolites in EPS appears to be independent of age, increasing the potential utility of these markers due to elimination of age as a confounding variable.

DTIC

Cancer; Detection; Magnetic Resonance; Magnetic Resonance Spectroscopy; Prostate Gland; Secretions

20070012861 John Wayne Inst. for Cancer Treatment and Research, Santa Monica, CA USA

Serum Genetic Markers as Surrogates of Prostate Cancer Progression

Hoon, Dave S; Apr 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0261

Report No.(s): AD-A463007; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463007>

The main purpose of the proposal is that detection of free tumor-related DNA marker(s) in serum can be used as surrogate genetic markers for monitoring ongoing events related to the pathogenesis of metastasis and provide prognostic insight into disease outcome and treatment response. The scope of the studies is to develop and validate tumor-related circulating DNA in serum of prostate cancer (PCA) patients. The goal is to validate these DNA markers. We have developed assays for circulating serum DNA in prostate cancer patients (PCA). The program has gotten on track in the past year since the approval of the Human subjects RB. PCA patient's and normal donor serum was accrued in the past year. We have been screening for new circulating methylated and unmethylated tumor-related DNA markers. Several DNA markers were found to correlate with PCA stage significantly. Highly sensitive assays were developed to detect these DNA markers in serum. Optimal conditions to obtain high specificity and sensitivity were determined. In the coming year more PCA patients will be accrued as well as further accrual of normal age-matched donors for the study. Assays for the markers will be carried out. We plan to complete the study in the upcoming year.

DTIC

Blood; Cancer; Deoxyribonucleic Acid; Genetics; Markers; Prostate Gland; Serums

20070012862 Rosalind Franklin Univ. of Medicine and Science, Chicago, IL USA

Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners

Zakowski, Sandra G; Sep 2005; 7 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0722

Report No.(s): AD-A463008; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463008>

This study examines the effects of a psychological intervention that encourages emotional expression in ovarian cancer patients and their partners. The specific aims of the study are as follows: (1) to examine the effectiveness of an emotional writing intervention for patients and their partners, (2) to examine mechanisms for the effects of expressive writing, and (3) to identify those individuals who are most likely to benefit from this type of intervention. Ovarian cancer patients (n=130) and their partners were recruited at Chicago area hospitals. Eligibility to participate included the ability to read and write in English, absence of any chronic condition or current or prior history of psychiatric disorder, and having a spouse or partner. Subjects were required to have a partner to maximize the effectiveness of the intervention. Subjects were recruited between 2 months and 5 years after diagnosis, and after completion of active cancer treatment (e.g., surgery, radiation). They and their partners were randomly assigned to an intervention group or a control group. Following Pennebaker's model, subjects in the intervention group were asked to write about their deepest thoughts and feelings regarding their cancer experience for 20 minutes each day for 3 consecutive days. The control group was asked to write about trivial non-emotional topics. Outcome variables, including psychological distress, quality of life, and physical symptoms, were assessed at baseline and over a period of 9 months after the intervention -- at 1 week and at 3, 6, and 9 months. To date, 83 subjects have been enrolled and are at various stages of the data collection process. Data processing, including data entry and verification, is continuing as planned and is current or has been completed for all subjects enrolled in the project. Preliminary data analyses are being conducted.

DTIC

Cancer; Emotional Factors; Emotions; Ovaries; Patients; Psychotherapy

20070012884 Shaw Environmental, Inc., Lawrenceville, NJ USA

Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0

Steffan, Robert; Fuller, Mark; Jul 31, 2004; 218 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463051; No Copyright; Avail.: CASI: [A10](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463051>

This project resulted in development and proof-of-concept laboratory testing of cost-effective technology to immobilize and biodegrade energetic compounds (TNT, RDX, HMX, and breakdown products) released as residues at firing ranges to prevent their migration to groundwater. The technology is comprised of a sorbent material to immobilize newly generated explosives residues at the soil surface, and a biostimulant to enhance the biotransformation and biodegradation of the explosive compounds before they can migrate into the soil and down to the groundwater. Using a tiered approach, multiple potential sorbents and biostimulants were screened.

DTIC

Explosives; Fires; Immobilization; Residues; Soils; Sorption

20070012891 Baylor Coll. of Medicine, Houston, TX USA
Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer

Herynk, Matthew H; Fuqua, Suzanne A; Jun 2004; 7 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0417

Report No.(s): AD-A463060; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463060>

The estrogen receptor (ER) plays a major role in breast tumor progression, we have recently discovered a somatic mutation (A908G) that leads to a lysine to arginine (K303R) amino acid change. Here we proposed to study if the K303R ER mutation is prognostic clinical factor for invasive breast cancer. Our initial studies have indicated that the mutation is present in approximately 53% of invasive breast cancers. Additionally, the mutation was more prevalent in nodepositive breast cancer versus node-negative breast cancer (85% vs. 38%, respectively). Specific Aim 1 has been completed and we are proceeding with specific Aim 2. Analyzing a larger patient population with long-term clinical follow-up. In the near future we will be begin creating the expression vectors and cell lines required to complete specific Aim 3. While our initial data suggest that the K303R ER mutation may be involved in tumor progression and metastasis, completion of specific Aims 2 and 3 will confirm these results.

DTIC

Breast; Cancer; Estrogens; Mammary Glands; Metastasis; Mutations

20070012892 New York Univ., New York, NY USA

Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer

Curtin, John P; Aug 2003; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0668

Report No.(s): AD-A463061; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463061>

Immunologic approaches to treat ovarian cancer, a chemosensitive tumor, are in their infancy and have generally represented isolated clinical trial efforts. Further understanding of the host response to epithelial cancers and the potential capability of innovative immunologic technologies to ovarian cancer may play a key role in therapeutic advances. This integrated program proposes to expand the scope of ovarian cancer treatment in general, and immunotherapy in particular by working in three new and interrelated directions. These include: 1) new techniques that may identify relevant new human antibodies and characterize the target antigens, 2) test these in project models to evaluate the potential role in future therapy for ovarian cancer combined with radiation and chemotherapy, and 3) explore their role in allowing for the more accurate targeting of gene therapy. During the first year of the project, we were able to establish a cohesive working group. IRB approval was obtained. Standard opera procedures regarding collection of lymphatic tissue and transfer to PI for Project 1 were established. Initial work was begun on Project 2 and Project 3.

DTIC

Antibodies; Antigens; Cancer; Epithelium; Gene Therapy; Ovaries

20070012893 Army Medical Research Inst. of Chemical Defense, Aberdeen Proving Ground, MD USA

Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins

Apland, James P; Kincaid, Randall; Oyler, George; Adler, Michael; Apr 2006; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463062; USAMRICD-TR-06-01; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463062>

Two hybrid vectors were designed for the expression in E. coli of fluorescent fusion proteins containing the protein translocation domain designated as Tat. The Tat domain was introduced to promote the entry of cargo protein, in this case the fluorophore yellow fluorescent protein (YFP), into cells. The first construct was made by fusing Tat with YFP. The second Tat fusion protein was constructed to contain YFP and the palmitoylation domain (Palm) from SNAP-25. The Palm domain was intended to bind the fusion protein to intracellular membranes and trap the fluorophore inside the cells. Intracellular localization of both proteins was demonstrated by laser confocal microscopy. This research serves as proof of the concept that such Tat fusion constructs may be useful in intracellular delivery of proteins and drugs that normally cannot penetrate the cell membrane and that the Tat domain remains functional with an intracellular palmitoylation trapping domain present.

DTIC

Conjugation; Fluorescence; Proteins

20070012916 Vanderbilt Univ., Nashville, TN USA

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene

Yaspan, Brian; Nov 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0057

Report No.(s): AD-A463100; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463100>

There is a significant heritable component of prostate cancer. Increased familial relative risk is observed across multiple populations (European, Asian-American, African-American and Caucasian). Male first degree relatives of prostate cancer patients have a two- to three-fold increased risk. Segregation analyses support genetic rather than shared environmental risk. Twin cancer concordance studies reveal a higher heritable risk for prostate cancer than for any other common cancer. A Scandinavian study of 44,788 twin pairs estimated that 42% risk of prostate cancer is heritable; the concordance rate was 21% among monozygotic twins, and 6% among dizygotic twins. Large-scale US twin studies have revealed comparable concordance rates. Additional epidemiological studies have been consistent with X-linked transmission, identifying higher risk for a man with an affected brother relative to one with an affected father. Despite the overwhelming genetic predisposition evidence, the identification of prostate cancer susceptibility genes has been difficult. Linkage studies have resulted in the identification of several loci difficult to confirm across study populations. However, summary studies of genome-wide scans for prostate cancer susceptibility loci in general confirm two loci, HPC-1 and HPC-X. Our study seeks to identify a candidate gene or genes conferring prostate cancer susceptibility at locus HPC-X in a US Caucasian study population. We hypothesize that a gene or genes at HPC-X harbor common moderate-penetrance variants predisposing to prostate cancer, with a role much greater than that inferred through study of rare HPC families. We looked at shared haplotypes in founder populations and found two intervals likely to harbor prostate cancer susceptibility genes. We have chosen to first focus on one interval at locus HPC-X (termed HPC-X region A) due to shared haplotype association evidence in the founder populations of Finland, Iceland and Ashkenazim.

DTIC

Cancer; Epidemiology; Genes; Linkages; Males; Prostate Gland

20070012925 Johns Hopkins Univ., Baltimore, MD USA

Intra-Operative Dosimetry in Prostate Brachytherapy

Jain, Ameet; Nov 2006; 92 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0003

Report No.(s): AD-A463119; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463119>

Favorable outcome in prostate brachytherapy critically depends on the accurate placement of radioactive sources in their planned locations. Unfortunately, there is variety of mechanical factors that cause the seeds to divert from their planned locations. While this problem has been known to brachytherapists, current technology does not allow for reliable localization of the implanted sources, thereby prohibiting the prediction and modification of seed distribution intra-operatively. The Research Objective of the proposal is to develop and evaluate ex-vivo a method for intra-operative localization of the implanted seeds in relation to the prostate, to facilitate in-situ dosimetric optimization and exit dosimetry. In particular, we will: [1] Registration of Ultrasound to Fluoroscopy (RUF): Develop methods for reconstruction of seed implants from X-ray fluoroscopy and spatially register them to the prostate anatomy identified in TRUS [2] System Integration: Integrate the above methods in a software package and link it with the FDA-approved CMS Interplant prostate brachytherapy system to enable in-situ dosimetry calculation [3] Experimental Validation: Evaluate the performance of the RUF system on phantoms and pre-recorded patient data.

DTIC

Cancer; Dosimeters; Prostate Gland

20070012930 Johns Hopkins Univ., Laurel, MD USA

Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance

McKneely, Jennifer; Bevan, Matthew; Cropper, Kevin; Iny, Mandy; Vaughan, Frank; Jun 2006; 15 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463139; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463139>

Human decision making and situation awareness (SA) are critical in Command and Control (C2) making the C2 environment ideal for understanding implications of cognitive state on operational performance. This pilot study investigated

the effects of fatigue on SA, and the extent that physiological measures correlate with performance. Six novice participants were tested every three hours during the final 24 hours of a 36-hour period of wakefulness on SA, psychomotor vigilance (PVT), and Automated Neuropsychological Assessment Metrics (ANAM) tests. Additionally, heart rate, heart rate variability, and activity were monitored. Initial analyses indicate changes in SA were not correlated with fatigue; potentially reflecting learning effects of fatigue, as opposed to SA. PVT results were similar to previous literature showing a significant performance drop in the early hours of the morning. The ANAM battery showed unexpected results; the Stanford Sleepiness scale correlated best ($=.01$) with heart rate and second with activity ($=.05$) and the logical reasoning-symbolic test result showed a statistically significant correlation with ($=.01$) heart-rate variability. A follow-on study will be conducted with experienced participants, (controlling the learning confound). Additionally, the study will investigate whether or not the degree of SA (high, medium, low) degrades differentially with fatigue.

DTIC

Command and Control; Decision Making; Evaluation; Mental Performance; Sleep Deprivation; System Effectiveness

20070012932 Texas Univ., Houston, TX USA

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer

Wong, Franklin C; Jul 2006; 66 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0455

Report No.(s): AD-A463155; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463155>

This study has been designed to evaluate the sequestration of proprietary radiopharmaceuticals Radioactive Gallium Iron Macroaggregates (GIMA) after intratumoral injection. Our team has adopted a 2-prong approach. While the official approval of the human protocol is ongoing, we continue on translation studies using in vivo imaging methods to investigate our institution-approved animal tumor models in rats and dogs. We made revisions to the approved human protocol and received preliminary approval from the Army in March 2005, awaiting the final approval of the revisions by the MDACC IRB. Because of the de-commission of our institutional Radioactive Drug Research Committee (RDRC) in 2005, we have sought other approval avenues to conduct the human study in compliance with FDA regulation. While an IND route was in progress, our large animal tumor models in 5 dogs (avg 20Kg) yielded confirmatory results for sequestration of Ga-68 GIMA. The remaining scientific question is the demonstration of persistent sequestration of GIMA in human breast cancer for derivation of dosimetry. In the meantime, our institution has reapplied to the FDA to reestablish the RDRC, which will be the most appropriate authority to supervise the low-dose Ga-67 GIMA protocol of 5 patients. We expect to regain the RDRC approval within the next few months and conclude this project within 12 months.

DTIC

Breast; Cancer; Dosimeters; Gallium; Injection; Mammary Glands; Pharmacology; Radiation Dosage; Radioactive Isotopes; Radioactive Materials

20070012933 Jackson (Henry M.) Foundation, Rockville, MD USA

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring

Miller, Alexandra C; Jan 1, 2006; 26 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0185

Report No.(s): AD-A463156; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463156>

The Persian Gulf War resulted in friendly fire casualties among U.S. personnel injured by fragments of depleted uranium (DU) munitions. The demonstrated effectiveness of such weapons makes it likely that they may be used against U.S. forces in future conflicts. Uncertainty about how aggressively to remove fragments of the radioactive, chemically toxic DU has stimulated research into the long-term health consequences of embedded DU fragments. There has been no previous research to determine whether long-term exposure to embedded DU can affect the health of offspring of personnel wounded by DU. This study investigated whether male mice carrying embedded fragments of DU or WA transmitted genetic damage to their offspring. We hypothesized that long-term chronic exposure to embedded DU or WA would result in paternal transmission of genetic damage to unexposed F1 generation offspring, characterized by increased frequency of in vivo mutations in tissues. The data demonstrated that DU and WA can induce genomic instability in unexposed offspring. The findings also show that DU and WA are mutagenic to chronically exposed rodents. DU and WA can cause direct DNA damage to sperm in these chronically exposed rodents.

DTIC

Damage; Embedding; Exposure; Genetics; Genome; Injuries; Progeny; Spent Fuels; Uranium

20070012946 Vanderbilt Univ., Nashville, TN USA

Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy

Ghosh, Ritwik; Nov 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0015

Report No.(s): AD-A463200; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463200>

The long term goal of this work is to determine whether stathmin can be targeted as an effective therapy in the clinic against prostate cancer. The central hypothesis of this proposal is that overexpression of stathmin promotes prostate cancer development and blocking stathmin expression sensitizes prostate cancer cells to anticancer therapies such as Taxotere and Erbitux. The purpose of this work is to i) correlate stathmin overexpression with progression of prostate cancer, ii) determine the signaling pathways activated through selective phosphorylation of stathmin and whether inactivation of these pathways promotes sensitization to treatment with Taxotere or Erbitux and iii) examine the effects of stathmin expression on tumor development and the outcomes of Taxotere, Erbitux on blocking tumorigenesis in tissue recombination and transgenic mouse models. The rationale is to develop combinatorial treatment strategies for better clinical management of prostate cancer patients. Targeting stathmin in prostate cancer can potentially sensitize patients to treatment with Taxotere or Erbitux. Since the agents selected have already been used in the clinic, successful outcomes in the animal models can result in rapid clinical trials.

DTIC

Cancer; Prostate Gland; Targets; Therapy

20070012947 Illinois Univ., Chicago, IL USA

Selenoproteins and Prostate Cancer

Diwadkar-Navsariwala, Veda; Nov 2006; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0009

Report No.(s): AD-A463203; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463203>

For this postdoctoral fellowship the specific role of selenoproteins (SP) in prostate cancer (PCa) was investigated. First the response of varying allelic identities in the SP glutathione peroxidase (GPx-1) to selenium (Se) supplementation was determined. GPx-1 has either a leucine (leu) or proline (pro) amino acid at the 9S codon and cancer risk has been shown to vary depending on the allelic identity. Our investigation showed that the prostate cell line LNCaP containing leu at the 198 codon was more responsive to Se supplementation although its baseline GPx activity was lower compared to cells with a pro at the same codon. These studies have increased our understanding of the effect of genetic variations in GPx-1 on the response to dietary Se and are relevant to the observed effects of Se in the SELECT trial. Second using the siRNA technique levels of GPx-1 were significantly reduced in LNCaP cells and the effect on DNA damage investigated. Compared to control transfectants cells with reduced GPx-1 levels were found to be more susceptible to UVC induced DNA damage as assessed by micronucleus formation. Se supplementation was more effective in attenuating micronucleus formation in the control compared to GPx knock-down transfectants suggesting that maximum benefits were achieved through its regulation of GPx-1. Studies in transgenic mice that express reduced levels of SP and an increased risk for PCa indicated that Se supplementation attenuated the progression to high-grade prostatic intraepithelial neoplasia (PIN) in the wildtype but not in the SP deficient animals. This benefit however was not observed with histopathological progression to low-grade PIN or microinvasion. Collectively these studies suggest that Se effects in PCa may in part be mediated through SP.

DTIC

Amino Acids; Cancer; Damage; Deoxyribonucleic Acid; Prostate Gland

20070012951 Burnham Inst., La Jolla, CA USA

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling

Matsuzawa, Shu-ichi; Nov 2006; 21 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0007

Report No.(s): AD-A463208; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463208>

The androgen receptor (AR) signaling-pathway plays crucial roles in the growth and progression of prostate cancer cells. Recent studies indicate that beta-Catenin physically binds to AR and enhances its transcriptional activity in a ligand dependent manner. p53 has also been implicated in AR signaling because of its ability to induce expression of Siah1, which hinders and activates E3 ligase complexes which degrade beta-Catenin. In this study, we demonstrated the biological significance and

molecular mechanisms by which AR is regulated by the p53-induced Siah1 protein. Moreover, we identified the relevant proteins that are targeted for degradation by Siah1 besides beta-Catenin. Thus, enhanced Siah function may suppress the ability of androgen to promote tumor cell growth. Understanding more about the functions of Siah-family proteins may therefore suggest novel strategies for chemoprevention and for improved treatment of prostate cancer.

DTIC

Cancer; Degradation; Hormones; Males; Prostate Gland; Proteins

20070012995 West Virginia Univ., Morgantown, WV USA

Health-Related Quality of Life for Pediatric NF1 Patients

Bradlyn, Andrew S; Harris, Carole V; Aug 2006; 26 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0654

Report No.(s): AD-A463390; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463390>

The objective of this project is to develop an NF1-specific health-related quality of life (HRQL) instrument for use with pediatric patients. Semistructured interviews with children with NF1, their parents, and teachers were used to derive important domains and item content, and the first generation instrument was developed. This instrument has undergone an initial examination of its psychometric properties and the content was revised accordingly. Following this initial field trial, the second generation instrument will be tested administered in a battery of measures to further assess its reliability and validity as well as its applicability in a clinical trials setting. At the conclusion of this third year, we have completed all interviews, transcribed all interviews, and reviewed them for content. This content review was then used to develop the first generation instrument. The instrument was completed by 83 children with NF1 and 83 parents of children with NF1. The resulting responses have been analyzed for internal consistency and feasibility. The instrument demonstrated acceptable internal consistency (coefficient alpha) and was not perceived as either difficult or upsetting to complete. The final task of this project focuses on the test-retest reliability and validity of the instrument. Children with NF1 and their parents will complete the NF1-specific measure, in addition to parent- and self-report measures of behavior, functioning, and generic health-related quality of life.

DTIC

Health; Patients; Reliability

20070012996 Chicago Univ., Chicago, IL USA

Undergraduate Summer Training Program in Breast Cancer Imaging

Giger, Maryellen L; Aug 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0310

Report No.(s): AD-A463391; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463391>

Imaging is used in virtually every cancer patient, in many animal models of cancer, and in a large number of in vitro cancer-related experiments. Imaging research is thus fundamental to advanced cancer research. The medical physics program at the University of Chicago is recognized internationally for its research excellence and for its training of investigators at the pre-doctoral and postdoctoral level. Many of the trainees go on to careers in cancer research. We believe that exposure and immersion of undergraduate students in summer research in breast cancer imaging is expected to provide a forum for establishing a set of next-generation researchers who will pursue breast cancer research via Ph.D. or Ph.D./M.D. programs as their career. Six undergraduate students participate in research in breast cancer imaging at the University of Chicago within the laboratory and administrative structure of the well-established Graduate Programs in Medical Physics. Six summer students in the Summer 2005 quarter learned and experienced research in breast cancer imaging through didactic lectures, hands-on research, interactive research project meetings, formal research seminars, and in the writing and oral presentation of their research. All four of the mentors who participated as primary summer advisors in the grant (Giger, Halpern, Jiang, and Nishikawa) have a long history of breast cancer research and funding.

DTIC

Breast; Cancer; Education; Imaging Techniques; Magnetic Resonance; Mammary Glands; Summer

20070012998 Vanderbilt Univ., Nashville, TN USA

Role of TGF-beta in Prostate Cancer Progression

Ao, Mingfang; Oct 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0583

Report No.(s): AD-A463396; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463396>

Carcinoma arises from epithelium, however, there is growing evidence that inflammation and interactions with the surrounding stromal microenvironment are critical for cancer initiation and progression. Stromal alterations during tumorigenesis have been shown in prostate cancer and many other tumors. As a major component of the stroma, fibroblasts are recognized as prominent modifiers of cancer progression. The contribution of carcinoma associated fibroblasts (CAF) to cancer has been demonstrated and become accepted, research has been conducted to understand the mechanisms underlying this stromal-epithelial interaction. In the last year, we aimed to identify pathways which could elicit tumor-promoting paracrine effects and whose expression patterns correlated with those seen in human disease. We found that although BPH-1 cells showed growth inhibition upon TGF-Beta treatment, the tumorigenic derivative BPH-1CAFTD lines skipped such inhibition via the effects of elevated levels of constitutively active Akt expression, which blocked nuclear translocation of Smad3 and p21. We also demonstrated that elevated stromal TGF-Beta signaling is essential for CAF to induce tumor from BPH-1 cells in vivo and in vitro. To explain the paradox, we conducted further work and delineated that CAF secretes elevated level of TGF-Beta and SDF1 in parallel. TGF-Beta was shown be able to induce the specific receptor of SDF1, SDF1 signaling contributes significantly to the elevation of phosphorylated Akt in the target epithelial cells. The data generated here demonstrate synergistic links between these TGF-Beta and CXCL12/SDF1 pathways acting as critical components of CAF-driven tumorigenesis in vivo.

DTIC

Cancer; Epithelium; Prostate Gland

20070013000 Pennsylvania State Univ., University Park, PA USA

Anticancer Inhibitors of AR-Mediated Gene Expression

Peterson, Blake R; Nov 2006; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0017

Report No.(s): AD-A463403; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463403>

New drugs that halt the progression of prostate cancers are urgently needed. Because many prostate cancers require the androgen dihydrotestosterone to proliferate, antiandrogens such as casodex (bicalutamide) are often the first line therapy for treatment of this disease. However, this drug and other clinically employed antiandrogens generally suffer from low affinity for the androgen receptor (AR), low selectivity across the nuclear hormone receptor superfamily, and do not achieve complete androgen blockade. As an alternative, mifepristone (RU486) is under investigation as a potential anticancer agent effective against prostate cancers. This drug is a highly potent antiprogesterin (IC₅₀ = 25 pM) but also exhibits potent antigluccorticoid (IC₅₀ = 2.2 nM) and antiandrogen (IC₅₀ = 10 nM) activities. Although mifepristone is effective against prostate cancer cells in vivo, the use of this drug as a chronically administered anticancer agent is severely limited by its potent antigluccorticoid activity. We investigated novel anticancer agents structurally related to mifepristone but that are designed to lack the antigluccorticoid activity associated with this drug. Some compounds identified were more potent than casodex against LnCaP cells.

DTIC

Cancer; Gene Expression; Inhibitors; Pharmacology; Prostate Gland

20070013146 Washington Univ., Saint Louis, MO USA

Role of the ARF Tumor Suppressor in Prostate Cancer

Maggi ,Jr , Leonard B; Weber, Jason D; Chinnaiyan, Arul M; Goodfellow, Paul J; Kibel, Adam S; Milbrandt, Jeffrey D; Humphrey, Peter A; Oct 2006; 120 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0909

Report No.(s): AD-A462908; No Copyright; Avail.: CASI: A06, Hardcopy

The nucleolar tumor suppressor ARF plays an important role in the tumor surveillance of human cancer. We have found that ARF expression is absent from highly proliferative prostate adenocarcinomas and this correlates with the increased expression of the p53-independent target of NPM. We have created and characterized an immortalized ARF-null prostate epithelial cell line. In addition we have shown that alterations in NPM levels can have dramatic effects on the androgen-dependent cancer cell line, LNCaP, but not PC3 cells which are androgen-independent. We have previously shown that ARF inhibits NPM's nuclear export and cell cycle progression in a p53-independent manner. Under this proposal we have defined the mechanism by which this happens. Specifically, ARF binds to NPM preventing its ability to carry both small and large ribosomal subunits out of the nucleus. This results in a decrease in protein synthesis and growth rates contributing to ARF's tumor suppressor function. We are beginning to further define the role of ARF in prostate cell growth. These studies

are opening the door to new therapeutic targets in prostate cancer; namely protein synthesis.

DTIC

Antigens; Biosynthesis; Cancer; Prostate Gland; Suppressors; Tumors

20070013148 North Carolina Univ., Chapel Hill, NC USA

Purification and Characterization of the Danaus Plexippus Cryptochromes

Denaro, Tracy R; Jan 2006; 71 pp.; In English

Report No.(s): AD-A462912; AFIT-CI07-0012; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Cryptochromes are flavoproteins that function as blue-light photoreceptors to regulate growth in plants and to entrain the circadian clock in animals. The photochemical and signaling mechanisms by which cryptochromes function are still undefined. Two cryptochromes identified in *Danaus plexippus* have shown distinct in vivo activities where DpCry1 is similar to *Drosophila melanogaster* cryptochrome and DpCry2 is similar to mammalian cryptochromes. I purified and biochemically characterized both *D. plexippus* cryptochromes. DpCry1 is the first animal cryptochrome to contain near-stoichiometric flavin. Photoreduction of FADox to FAD and fluorescence lifetime measurements showing an extremely short lifetime of flavin in DpCry1 both suggest a novel photochemical mechanism for DpCry1. DpCry2 contained only trace amounts of flavin and both proteins contained sub-stoichiometric MTHF. Purification of DpCry1 as the first animal cryptochrome with near-stoichiometric flavin will enable crucial in vitro biochemical and biophysical experiments that have never been conducted on an animal cryptochrome.

DTIC

Photoreceptors; Proteins; Purification

20070013150 Texas Univ. Health Science Center, San Antonio, TX USA

JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals

Vijayalaxmi.; Cameron, Ivan L; Jan 30, 2007; 25 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0079; Proj-2312

Report No.(s): AD-A462916; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Genotoxicity is often linked to carcinogenesis. The assessment of the genotoxic potential of any 'agent' is important in terms of suggesting its carcinogenic potential. Hence, the evaluation of the genotoxic potential of jet fuels, JP-8 and Jet-A has been proposed in these investigations. The rodent micronucleus (MN) assay, which detects micronuclei, arising from both chromosomal fragments and unequal segregation of chromosomes during cell division has been widely applied as an in vivo assay for detecting genotoxic agents. The assay became a standard test system for genotoxicity evaluations in regulatory agencies in several countries (Sofuni 1993, Kirkland 1993, Auletta et al., 1993, Health Protection Branch Genotoxicity Committee, Canada, 1993).

DTIC

Animals; Carcinogens; JP-8 Jet Fuel; Toxicity; Toxins and Antitoxins

20070013151 Wisconsin Univ., Madison, WI USA

Targeting Stromal Recruitment by Prostate Cancer Cells

Zhang, Jingxian; Mar 2006; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0157

Report No.(s): AD-A462917; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Sonic hedgehog(shh)overexpression in LNCaP cells accelerates tumor growth. To characterize the contributions of each Gli gene to Shh-induced tumor growth, Gli1, Gli2 and Gli3 knockout UGSM cells have been isolated and UGSM-2 cells independently over-expressing hGli1 and hGli2 were cloned. Experiments using those cell lines co-injected with LNCaP cells in the Xenograft model indicate stromal Shh signaling activation may play an important role in the tumor growth.

DTIC

Adenoviruses; Cancer; Prostate Gland; Ribonucleic Acids

20070013160 Wright State Univ., Dayton, OH USA

Proteomic Analysis of Cisplatin-Resistant Ovarian Concers

Turchi, John J; Mar 2005; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0155

Report No.(s): AD-A463194; No Copyright; Avail.: CASI: [A02](#), Hardcopy

One of the major clinical challenges in the treatment of ovarian cancer is that the cancer cells are or become resistant to the drugs used to treat the disease. When the cell no longer responds to the drugs the cancer continues to grow unabated. Some cellular factors that contribute to making a cell resistant to chemotherapy drugs have been identified though many still remain to be discovered. These cellular factors or proteins involved in drug resistance can be measured using sensitive analytical techniques. A major goal of the research proposed in this study is to analyze these proteins from ovarian cancer cell lines that are known to be either sensitive or resistant to the chemotherapeutic drug cisplatin a first line treatment for ovarian cancer. We will determine if there is a specific protein 'fingerprint' that is indicative of either sensitivity or resistance to cisplatin. Once the useful factors that influence drug resistance are identified in cell lines and verified using tumor biopsies we anticipate that this information could then be used to help predict whether a specific tumor will respond to a specific treatment. To date the sensitivity of a specific ovarian carcinoma to a specific treatment can only be assessed by administration of the treatment and then observing the outcome. Knowing the factors that contribute to a cancer being sensitive or resistant and having the methods to determine if these factors are present or absent in a given tumor are the goals of this proposal. This information could then be used in the clinical assessment to determine the best course of treatment for a specific cancer.

DTIC

Cancer; Drugs; Ovaries; Proteome

20070013164 Rothberg Inst. for Childhood Diseases, Guilford, CT USA

Generation of in Vitro Cellular Models of Lymphangi leiomyomatosis for the Development of Tuberous Sclerosis Therapeutics

Squillace, Rachel; Jan 1, 2006; 11 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0202

Report No.(s): AD-A463210; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The purposes of this work are three related objectives: to generate human TSC2-/- LAM cell lines; to generate matching inducible isogenic TSC2 knock-in cell lines; and to confirm the absence and rescue of TSC signaling in these LAM lines. We generated 400 immortalized LAM cell lines from two different LAM tissue sources and used immunoblot analysis to determine the loss of the TSC2 protein itself, or function as indicated by phosphorylation of the ribosomal protein S6 in the absence of serum. Despite the fact that the original LAM tissues suggested loss of TSC2 by FISH analysis in a subset of the tissue, none of the newly developed lines appear to be negative for TSC2. We feel, however, that these lines still be valuable to the TSC and LAM communities and we will therefore, disseminate the generated cell lines upon request.

DTIC

Diseases; Genes; Genetics; In Vitro Methods and Tests; Proteins

20070013165 California Univ., San Francisco, CA USA

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty

Boyer, Cherrie B; Shafer, Mary-Ann; Jan 2007; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0159

Report No.(s): AD-A463211; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Health damaging behaviors of young military personnel are reflections of health problems facing all young people in the U.S. Military life presents opportunities and challenges that may both protect and place young troops at risk for health damaging behaviors. Challenges for maintaining a healthy armed force include high rates of sexually transmitted infections (STIs), unintended pregnancies (UIPs), misuse of alcohol/substances, and personal sexual violence defined as violence within one's personal (dating or marital) relationships. The common thread through these negative health outcomes is volitional behavior. Such behaviors do not only result in illness or injury, but also negatively impact performance of military duties and threaten military readiness. Despite military leadership in setting standards and policies regarding professional behavior and universal health care for preventing and eliminating such negative health outcomes, many health problems remain. Building on our previous military research, we plan to develop and evaluate a cognitive-behavioral, skills-building intervention to prevent and reduce young troops' risk for STIs, UIPs, alcohol/substance misuse, and personal sexual violence. This research also seeks to establish the best training practices for educating young troops about health issues that impact military performance and readiness. Finally, it will have direct implications for health promotion and disease prevention education strategies designed to reach military men and women early in their careers.

DTIC

Damage; Diseases; Health; Military Personnel; Prevention

20070013166 Pennsylvania Univ., Philadelphia, PA USA

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination

Domchek, Susan M; Sep 2006; 15 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0619

Report No.(s): AD-A463212; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Molecular targets to facilitate early detection and preventative therapy for women at high risk for breast cancer have not been characterized. Two recently characterized intracellular enzymes -- human telomerase reverse transcriptase (hTERT) and the cytochrome P450 isoform 1B1 (CYP1B1), each overexpressed in ~90% of invasive breast cancers but rarely found in normal tissue -- may fill this gap. Such targets, if found at the earliest time of malignant transformation, may be ideally suited not only for early detection but also cancer prevention by vaccination. A growing clinical experience in advanced cancer patients has underscored the safety and feasibility of vaccination strategies. The universal expression of hTERT and CYP1B1 provide an opportunity for both early detection and cancer vaccination. Objective/Hypothesis: We hypothesize that immunologic responses can be elicited in advanced breast cancer patients using vaccines incorporating hTERT, providing a safety and feasibility platform for ultimately vaccinating women at high risk for breast cancer. Although we have not found ductal lavage a feasible strategy for the detection of tumor antigens, we have made significant progress on vaccination strategies in women with metastatic breast cancer.

DTIC

Antigens; Breast; Cancer; Detection; Immunology; Mammary Glands; Targets; Therapy

20070013167 Texas A&M Univ., College Station, TX USA

FGF Signaling and Dietary Factors in the Prostate

Wang, Fen; Sep 2006; 131 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0014

Report No.(s): AD-A463213; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Purpose: To study the FGF signaling axis in prostate homeostasis and tumorigenesis, to evaluate dietary factors in modulating FGF signals in the prostate. Scope: To develop mouse models resembling human prostate tumor progressions for screening therapeutic strategies for prostate cancers and evaluating dietary factors in prostate cancer prevention. Major Finding: Ectopic expression of the constitutively-active FGFR1 (caFGFR1) in the prostate induces high-grade prostatic intraepithelial neoplasia (PIN) in transgenic mice in an expression level-dependent manner. Repression of the resident FGFR2 in the prostate also disturbs homeostasis in the prostate as well as potentiates the PIN lesions induced by the ectopic caFGFR1. Up-to-date Progress: Establishing mouse colonies with prostate-specific FGFR2 disruption and caFGFR1 expression for further characterizations of the FGF signaling and dietary factors in prostate lesions. Generation of a conditional expression vector for expressing FGFR1 in the prostate. Characterization of the prostate of FGFR2 conditional null mice. Generation of 4 transgenic lines for conditional expression of caFGFR1 in the prostate. Significance: Together with previous data from the Dunning prostate tumor model, the findings demonstrate that aberrant FGF signals in the prostate strongly disrupt tissue homeostasis and promote prostate tumor development and progression. The model provides a useful tool for evaluating other tumor initiating factors, including those that cause genetic instability and other oncogenic lesions in prostate tumorigenesis.

DTIC

Cancer; Diets; Genes; Homeostasis; Prostate Gland; Tyrosine

20070013177 California Univ., Los Angeles, CA USA

Microlocalization and Quantitation of Risk Associated Elements in Gleason Graded Prostate Tissue

Eckhart, Curtis D; Mar 2006; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0067

Report No.(s): AD-A463233; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of this proposal was to determine the concentration and location of elements in normal and tumor tissue. Specific aims included: (1) preparation of Gleason graded prostate tissue, (2) determination of tissue concentrations of: B, Ca, Cd, Se and Zn; and (3) determination of tissue and cellular distribution of these elements using a NanoSIMS ion microscope at Lawrence Livermore National Laboratory (LLNL). Completion of specific aims 1, 2 showed that the concentrations of the elements did not correlate with Gleason status. They also showed that B was unique in its variability. Aim 3 was accomplished in part, but imaging was impaired by ice crystal formation. We made progress in the 3rd year in both methodology to improve samples resolution and identifying subcellular B targets for B as a way around the resolution problem. These included: (1) Slam freezing samples to -196 deg C followed by vacuum dehydration \h- 80 deg C to avoid ice crystal formation and

identification of two potential subcellular proteins CD38 on the plasma membrane and the ryanodine receptor on the endoplasmic reticulum.

DTIC

Cancer; Prostate Gland; Risk

20070013178 Beth Israel Deaconess Medical Center, Boston, MA USA

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer

Chen, Shaoyong; Oct 2006; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0861

Report No.(s): AD-A463234; No Copyright; Avail.: CASI: [A03](#), Hardcopy

One part of the Final report was included in the attached Manuscript, demonstrating a positive role of Pin1 in PCa progression. The mechanisms include that Pin1 can enhance beta-catenin nuclear localization, TCF/beta-catenin dependent Topflash activity, and c-Myc and Cyclin D1 expression, and disrupt AR-mediated suppression of TCF/beta-catenin signaling. We provided additional data suggesting Pin1 reduces AR transcriptional activity and PSA expression, mediated by repression of the N-C interaction. We also showed that in androgen-independent PCa C4 cells pin1 is overexpressed and overexpression of Pin1 in LNCaP cells leads to increased invasiveness. We confirmed the Pin1 is involved in the G2-M checkpoint in PCa cells, however its connection to PCa development is unclear. Another finding is that APC is expressed mainly in LNCaP nucleus and our preliminary results showed reduction of APC expression in LNCaP and PC3 cells leads to enhanced beta-catenin/Tcf4 activity.

DTIC

Cancer; Hormones; Males; Pins; Prostate Gland

20070013179 State Univ. of New York, Stony Brook, NY USA

Integrated Cancer Research in Five Thematic Areas of Interest

Bahou, Wadie F; Jul 2006; 10 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0754

Report No.(s): AD-A463235; No Copyright; Avail.: CASI: [A02](#), Hardcopy

During the last FY of the award, the Cancer Institute of Long Island benefited from CDMRP funding in a manner consistent with the proposed activities of the award. In the area of core instrumentation acquisition, an Olympus upright microscope has been added and integrated in to the previously funded two-photon system. The new instrument is essential for in vivo imaging for mice and rats. The previously funded Zeiss TIRF Microscope system is now operational. A new, state-of-the-art VisualSonics small animal ultrasound has been brought online to support mouse tumor models. The University has endeavored to create a Mouse Metabolic Phenotyping Core to support cancer research activities for cancer researchers. Consistent with the funding for this initiative were the granting of multi-year RSU packages, or Research Support Unit. RSU's are a mechanism to ensure necessary support for junior faculty and work as enhancements to enable the successful establishment of their laboratories. The final year of funding for Dr. Mirjana Maletic-Savatic, M.D., Ph.D. Assistant Professor of Neurology (new RSU) was provided via this mechanism. Her laboratory is now fully established and operational.

DTIC

Cancer; Imaging Techniques; In Vivo Methods and Tests; Medical Science; Research Management; Systems Integration

20070013180 Duke Univ., Durham, NC USA

Enhancement of Anti-Telomerase Immunity Against Prostate Cancer

Vieweg, Johannes; Nov 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0011

Report No.(s): AD-A463236; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The overall objective of this proposal is to enhance the efficacy of cancer vaccines by selectively eliminating or reducing CD4+ regulatory T cells (Treg) expressing the high affinity CD25 IL-2-specific receptor (IL-2R) in patients with metastatic prostate cancer. Preclinical and clinical data from our laboratory (see Reference 1 and Appendix A) and others (2, 3) have shown that CD4+/CD25+ Treg play an important role in the suppression of T cell responses and that elimination of Treg is capable of enhancing T-cell proliferation and cytolytic activity in vitro. We have also demonstrated that human Treg can selectively be depleted in cancer patients using the IL-2/diphtheria toxin conjugate denileukin diftotox, without inducing toxicity on other cellular subsets with intermediate or low expression of CD25 (1). Most importantly, denileukin diftotox-mediated elimination of Treg followed by vaccination with tumor RNA-transfected DC significantly improved the

stimulation of tumorspecific T-cell responses in RCC patients, when compared to vaccination alone. These findings formed the basis of this proposal aimed to augment a vaccine-induced T cell responses by pretreatment of prostate cancer patients with agents that can lead to the preferential depletion of the CD4+/CD25+ regulatory T cells, such as agents which target and kill cells expressing the IL-2 receptor CD25 subunit.

DTIC

Augmentation; Cancer; Lymphocytes; Prostate Gland; Vaccines

20070013181 Dana Farber Cancer Inst., Boston, MA USA

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays

Beroukhim, Rameen; Nov 2006; 55 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0031

Report No.(s): AD-A463238; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The proposal for DOD Award #W81XWH-05-1-0031 focused on the systematic mapping of large scale genetic alterations in prostate cancer, and relating these mutations to prostate cancer progression. To that end, the proposal suggested the application of single nucleotide polymorphism (SNP) array technology to characterize large-scale genetic alterations in the prostate cancer genome.

DTIC

Cancer; High Resolution; Mutations; Nucleotides; Polymorphism; Prostate Gland

20070013182 Ecole Polytechnique Federale de Lausanne, Switzerland

An in Vitro Study of Breast Cancer Invasion into the Lymphatics

Swartz, Melody; Shields, Jacqueline; Aug 2006; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0492

Report No.(s): AD-A463239; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Lymphatic metastasis is a major prognostic factor for breast cancer patients. Despite its importance, the mechanisms underlying lymphatic metastasis are poorly understood and the question of how cancer cells access the lymphatics i.e. whether they primarily induce lymphangiogenesis (sprouting of new lymphatic vessels) or invade preexisting lymphatics is debated in the literature. We challenge the notion of tumor lymphangiogenesis as the major mechanism for tumor entry into the lymphatics and suggest that the biophysical and biochemical factors induced or produced by the tumor, including VEGF-C, act to promote tumor cell migration towards lymphatics, not vice-versa. In real mammary carcinomas (as opposed to subcutaneously xenografted), blood vessels are leaky, interstitial fluid pressure is high, and fluid exudes from the tissue into the surrounding stroma and eventually into the lymphatics. This biophysical environment promotes the transport of any tumor-secreted factors, including VEGF-C, from the tumor towards the lymphatics. In light of these factors, we hypothesized that tumor-secreted factors can be delivered to the lymphatics by natural biophysical forces, where it stimulates the production of tumor cytokines by the activated lymphatics, in turn promoting tumor cell invasion into surrounding lymphatics. In this one-year project, we proposed to first develop a novel tissue engineered tumor extracellular matrix (ECM)-lymphatic environment and then use it to answer questions relating to this novel hypothesis.

DTIC

Blood Vessels; Breast; Cancer; In Vitro Methods and Tests; Lymphatic System; Mammary Glands; Metastasis

20070013183 Michigan Univ., Ann Arbor, MI USA

Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation

Chan, Heang-Ping; Jul 2006; 71 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-01-1-0326

Report No.(s): AD-A463240; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The goal of this proposed project is to develop an automated technique to assist radiologists in estimating mammographic breast density. During the project years, we developed an automated mammographic density segmentation system, referred to as Mammographic Density ESTimator (MDEST), for both DMs and DFMs. Our studies showed that the automated MDEST system can provide percent dense area estimates that are highly correlated with radiologists interactive thresholding results and the percent volumetric fibroglandular tissue estimates from MR breast images. The quantitative estimates are superior to the radiologists qualitative BI-RADS density assessment. The MDEST system can provide a consistent and reproducible estimation of percent dense area on routine clinical mammograms. This will facilitate studies of various factors associated with breast cancer risk and mammographic sensitivity, and monitoring the effects of interventional or preventive strategies. The

image analysis tool will therefore contribute to the understanding of the relationship of density to breast cancer risk, detection, prognosis, and to the prevention and treatment of breast cancers.

DTIC

Breast; Cancer; Health; Mammary Glands; Risk

20070013184 Vanderbilt Univ., Nashville, TN USA

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening

Ou, Jao J; Miga, Michael I; Feb 2006; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0221

Report No.(s): AD-A463241; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of this project is to further develop modality-independent elastography as a system that is able to reproducibly detect regions of increased stiffness within the breast based on pre- and post- compression input images of the anatomy. As stated in the proposal, the original specific aims are concerned with enhancement of the method, investigation of texture and statistical analyses for evaluating the success of the method, and engineering of a device that can generate proper forces on mock setups within current available clinical imaging systems. To date, progress on each of these aims has been made in handling increased computational complexity, developing and testing metrics for the evaluation of reconstructions, and the fabrication of a compression chamber tested on a tissue-like polymer phantom.

DTIC

Breast; Cancer; Image Analysis; Image Processing; Mammary Glands; Tumors

20070013185 Columbia Univ., New York, NY USA

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks

Gautier, Jean; Oct 2006; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0494

Report No.(s): AD-A463242; No Copyright; Avail.: CASI: [A02](#), Hardcopy

BRCA1 is the major breast cancer susceptibility gene. It forms heterodimers with BARD1. Inactivation of either gene results in identical phenotypes suggesting that these proteins function primarily as a complex. BRCA1 deficiencies are associated with cellular phenotypes consistent with a DNA replication defect. We wished to test the hypothesis that BRCA1/BARD1 function during DNA replication supporting DNA transactions at replication forks. We are using cell-free extracts derived from *Xenopus laevis* eggs that support: 1. Semi-conservative, cell-cycle regulated DNA replication; 2. Many facets of the DNA damage response. Our key accomplishments were to generate specific antibodies against *Xenopus* BARD1 and BRCA1. We also demonstrate that the complex assembles to chromatin in a DNA replication-dependent manner. Finally, we show that BRCA1/BARD1 loading to chromatin does not dramatically increase following DNA damage, suggesting that it might be relocalized within chromatin compartments.

DTIC

Breast; Cancer; Deoxyribonucleic Acid; Genes; Mammary Glands; Tumors

20070013186 Johns Hopkins Univ., Baltimore, MD USA

Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation

Denmeade, Samuel R; May 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0304

Report No.(s): AD-A463243; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The underlying hypothesis of this proposal is that a breast tissue/cancer proteolytic activity can be identified by screening the extracellular fluid from human breast cancers with a fluorescence quenched random peptide library. The peptide substrate(s) identified from this screening could be used to produce prodrugs that are targeted for specific activation by proteolytic activity present in extracellular fluid of breast cancers while avoiding systemic toxicity. In the first year we developed methods to synthesize large fluorescently quenched peptide libraries as outlined in task 1 and screened for hydrolysis by human glandular kallikrein 2 shown to be present in ~ 75% of breast cancers. A peptide substrate was identified and couple to the thapsigargin analog, L12ADT to produce a prodrug that was readily hydrolyzed by hK2, stable in human plasma in vitro and mouse plasma both in vitro and in vivo, and was selectively cytotoxic to cancer cells in the presence of enzymatically active hK2. These studies demonstrated the feasibility of the approach to identification of protease substrates outlined in tasks 1-3 of the proposal. However, incubation of breast cancer homogenates or concentrated media from breast cancer cell lines did not yield any hydrolyzed peptides. This lack of hydrolysis is most likely due to a combination of ng/ml

concentrations of protease in the extracellular fluid and the need to dilute samples to cover entire bead library (i.e. 10-40 mls). New approaches are needed to identify breast cancer proteases that can concentrate proteases within breast cancer extracellular fluid or which can screen large libraries in much smaller volume. Two such methods, in vitro compartmentalization and macroglobulin complexation are being evaluated in the laboratory.

DTIC

Breast; Cancer; Drugs; Enzymes; Mammary Glands; Peptides

20070013188 Hamilton Coll., Clinton, NY USA

Development of a Computational Assay for the Estrogen Receptor

Shield, George C; Kirschner, Karl N; Jul 2006; 138 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0441

Report No.(s): AD-A463248; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Estrogen Receptor alpha (alpha ER), binds estradiol, initiating a cascade of events that leads to alpha ER-positive breast cancer. The alpha ER binds the FDA approved drug for breast cancer, tamoxifen, and also raloxifene, with high affinity. The crystal structures of the alpha ER-estradiol, alpha ER- tamoxifen, and ER-raloxifene complexes reveal that estradiol binding changes the conformation of helix 12 (H12) so that co-regulatory proteins can bind and activate transcription, whereas tamoxifen and raloxifene binding displaces H12 to a different position that prevents the binding of co-regulatory proteins. We have successfully combined MD & QM methods in an innovative way to develop a computational assay that will allow for the development of novel lead compounds that should be active against breast cancer. Our test system consists of estradiol, tamoxifen, and several known raloxifene analogs. MD simulations were performed for 3-5 nanoseconds on a truncated alpha ER protein bound to different ligands. These simulations generated input structures for a variety of methods, ranging from MM to QM, for determining energy the binding energy of ligands to the alpha ER. We have determined the optimal method for correlating binding energies to experimental relative binding affinities (RBAs). We will use this assay to design novel inhibitors with high-predicted activity.

DTIC

Assaying; Breast; Cancer; Estrogens; Hormones; Mammary Glands

20070013189 North Shore-Long Island Jewish Research Inst., Manhasset, NY USA

Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma

Shi, Y E; Jun 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0569

Report No.(s): AD-A463250; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The association between SNCG expression and the progression of steroid dependent cancers of breast and ovary promoted us to investigate the role of SNCG in regulation of ERalpha. SNCG strongly stimulated the ligand-dependent transcriptional activity of ERalpha in breast cancer cells. A notable finding relevant to this study is that SNCG, acting as a chaperone for ER, strongly stimulated the ligand-dependent transcriptional activity of ERalpha, ligand-dependent cell growth, and ligand-dependent mammary tumorigenesis. Augmentation of SNCG expression stimulated the transcriptional activity of ERalpha and ligand-dependent growth, whereas compromising endogenous SNCG expression suppressed ERalpha signaling and ligand-dependent growth.

DTIC

Breast; Cancer; Estrogens; Mammary Glands; Stimulation

20070013191 National Inst. of Health, Hamilton, MT USA

High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals

Caughey, Byron; Jul 2006; 36 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MIPR-3JD3G53125

Report No.(s): AD-A463253; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Transmissible spongiform encephalopathies are fatal untreatable neurodegenerative diseases associated with the accumulation of a disease-specific form of prion protein (PrPSc) in the brain. One therapeutic approach is the inhibitors of PrPSc accumulation indeed many inhibitors of PrPSc accumulation in scrapie-infected cells also have anti-scrapie activity in rodents During This year. cell line derived from deer has been chronically infected with CWD to more effectively search for agents to combat that disease Additionally two compounds That inhibit PrPSc accumulation in scrapie-infected mouse cells

and CWD-infected cells. iron tetrasulfonatophenyl porphyrin (FeTSP) and a degenerate 40 base phosphorothioates oligonucleotide (Randomer 1). were found to also have anti-scrapie activity in mice Randomer 1 mixed with infectious brain homogenate delays the onset of disease and also works prophylactically against an ip inoculated scrapie FeTSP has prophylactic activity as well as therapeutic activity against an existing scrapie brain infection which places it among a very small group of molecules with such activity Finally an antimalarial compound, mefloquine. which is an effective inhibitor of PrPSc in cell culture, did not demonstrate prophylactic anti-scrapie activity in mice This underscores the need to test promising anti-prion agents in animals prior to human trials.

DTIC

Animals; Cells (Biology); Culture Techniques; Infectious Diseases; Viral Diseases

20070013204 Beth Israel Deaconess Medical Center, Boston, MA USA

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment

Balk, Steven P; Oct 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0849

Report No.(s): AD-A463301; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Aim 1 is to determine the precise molecular basis for NCoR binding to the RU486 liganded AR. Since the previous report we have used chromatin immunoprecipitation to demonstrate that RU486 enhances AR NCoR recruitment to AR assembled on androgen regulated genes. We have also generated the additional AR and NCoR mutants to define the precise amino acids mediating the interaction. Aim 2 is to determine whether NCoR recruitment can suppress androgen independent expression of AR regulated genes and prostate cancer growth, and identify molecular markers that predict whether RU486 (or related drugs) will be effective in particular prostate cancers in vivo. We have now used chromatin immunoprecipitation to examine the functional effects of RU486 mediated NCoR recruitment, and find that NCoR is not mediating deacetylation and hence not suppressing gene expression. The reason for this is now under investigation. These results, in conjunction with our previous data, reflect further progress towards determining the structural basis for AR-NCoR interaction (Aim 1) and determining whether this interaction can be exploited to treat prostate cancer (Aim 2).

DTIC

Cancer; Hormones; Males; Prevention; Prostate Gland; Targets; Therapy

20070013205 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging

Ackroyd, Nathan C; Katzenellenbogen, John A; Oct 2006; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0681

Report No.(s): AD-A463303; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A class of breast tumors, known as ER+, contains significant concentrations of ER which functions to regulate cell growth, and mediate the action of estrogen antagonists. There is a need for the development non-invasive and reliable methods for the determination of tumor ER concentration in the identification of patients predicted to respond to hormone therapy. It has been shown that tumor ER concentration can be determined by imaging, using 18F-labeled ER selective ligands, and that the ER concentrations determined by imaging correlate well with those determined by immunoassay methods on surgical biopsies. Because of the short half-life of fluorine-18, this method is costly, with low availability. Thus, the development of an effective ER imaging agent that is of low cost and widespread availability might eliminate the need for tumor biopsy in the treatment selection for breast cancer patients. We propose the development of radiopharmaceutical imaging agents labeled with 99mTc, which is available at most hospitals at a relatively low cost, as a 99Mo/99mTc generator. Studies conducted in this laboratory suggest that an integrated organometallic design in which technetium bonded to carbon forms a part of the core structure will display the stability, as well the requisite affinity to ER.

DTIC

Breast; Cancer; Estrogens; Imaging Techniques; Ligands; Mammary Glands; Rhenium; Technetium; Tumors

20070013208 Texas Univ., Houston, TX USA

DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera

Issa, Jean-Pierre; Jelinek, Jaroslav; Oct 2006; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0535

Report No.(s): AD-A463306; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Polycythemia vera (PV) is a clonal myeloproliferative disorder (MPD) affecting erythroid, myelomonocytic, and megakaryocytic lineages. An activating somatic mutation of JAK2 tyrosine kinase is present in the majority of PV patients but also in 50% of patients with essential thrombocythemia (ET) and myelofibrosis (MF). Additional factors are presumed to affect the phenotype and progression of the disease. We studied DNA methylation as a possible epigenetic factor in the development and progression of polycythemia vera and related MPDs. We cloned 19 unique CpG islands in promoter/exon-1 regions of 15 known genes, and 4 predicted genes and annotated mRNAs as potentially hypermethylated in PV. We confirmed increased methylation of progesterone receptor and cadherin precursor (CDH13) in a subset of PV, MF and AML patients. We showed that a functional block of progesterone receptor in normal erythroid cells increases their sensitivity to erythropoietin. Silencing of these genes by methylation may contribute to disease development by altering the response of hematopoietic cells to proliferative stimuli or their interactions with stroma.

DTIC

Deoxyribonucleic Acid; Hematology; Methylation; Polycythemia

20070013209 Connecticut Univ., Farmington, CT USA

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding

Mayer, Bruce J; Aug 2006; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0540

Report No.(s): AD-A463307; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Improved molecular diagnostic methods that can classify tumors and predict their response to therapy have enormous potential to improve the effectiveness breast cancer treatments. The overall goal of this project was to develop a novel molecular diagnostic method, termed SH2 profiling, that can classify cell samples based on their global protein tyrosine phosphorylation state. The first aim was to use an existing SH2 profiling method, based on far-Western blotting, to analyze fresh surgical breast cancer samples. The second aim was to develop a more high-throughput quantitative reversed-phase SH2 profiling format, and test its usefulness in classifying breast cancer samples. The third aim was to develop histochemical SH2 profiling methods that can be used to analyze archived, formalin-fixed tissue sections, and perform pilot retrospective studies to determine whether SH2 binding patterns have potential prognostic value. Over the course of this study we have made great progress in developing a robust, quantitative, high-throughput SH2 profiling method. We have constructed a nearly complete set of human SH2 domain probes. We have used these tools to profile 20 human breast cancer surgical specimens. We find that SH2 profiles differ among different breast cancer samples, and provide information beyond that provided by standard clinical-pathological staging. Thus we have demonstrated the feasibility of SH2 profiling as a novel molecular diagnostic tool for classifying cancer and potentially predicting clinical outcomes.

DTIC

Breast; Cancer; Homology; Mammary Glands; Phosphorylation; Tyrosine

20070013213 Baltimore Research and Education Foundation, Inc., Baltimore, MD USA

Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology

Rohwer, Robert G; Alexeeva, Irena; Bugin, Marie; Sep 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0746

Report No.(s): AD-A463347; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The development of blood-based or other diagnostic tests for the TSE diseases should be greatly facilitated by an integrated set of compatible resources: 1) a susceptible large animal (sheep) to provide blood or other substrates, 2) susceptible transgenic rodents that can be used as a sensitive bioassay, 3) standard reference samples of brain, blood, and plasma of sufficient volume to be used by the TSE community. We are breeding a flock of 50 genotyped sheep to select for the high scrapie susceptibility genotype VVRRQQ. All three lines of the mouse transgenics carrying sheep, human, and elk PrP have been now re-derived. We have observed the first transmission of the disease from our standard scrapie-infected sheep brain inoculum to the transgenic mice with sheep PrP and have completed an end-point dilution titration. We have pooled and aliquoted the infected sheep whole blood, and separately, plasma (100 liters total). The pooled whole blood and plasma have been inoculated into transgenic mice for limiting dilution titrations that will quantify their exact level of infectivity, thus increasing their value to researchers. A protocol for sharing or sale of these resources has been prepared and samples have already been distributed.

DTIC

Hamsters; Hematology; Models; Radicals

20070013219 Dana Farber Cancer Inst., Boston, MA USA

Identification and Validation of PTEN Complex, Associated Proteins

Rabinovsky, Rosalia; Nov 2006; 18 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0029

Report No.(s): AD-A463362; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The PTEN/MMAC1/TEP1 is a tumor suppressor gene, targeted for biallelic somatic inactivation in a variety of cancers including advanced prostate adenocarcinomas among many others malignancies. PTEN is a phosphatase and has an important role in regulation of the PI3K/AKT signaling pathway, which plays a key role in regulating cellular functions including proliferation, apoptosis, glucose homeostasis, cell size, nutrient response and DNA damage. Furthermore, PTEN functions in the cell to restrict both growth and survival in absence of growth signals. Studies performed in our laboratory indicated that in addition to its 47Kda form, PTEN could be detected as a part of a 660Kda complex. Further, we have also shown that PTEN acts as an antagonist of the PI3K/AKT signaling, only when it is unphosphorylated and recruited into the large protein complex. We have identified a novel partner of the PAC. Our biochemical purification and immuno-precipitation experiments show that the p85 regulatory subunit of PI3K is a part of the PAC. The p85 subunit was co-immuno-precipitated with PTEN and migrates in parallel to PAC fractions both in the cytoplasm and the nucleus gel filtration, an observation which is consistent with our previous conclusion that there may be a single complex that can shuttle between the two compartments and that the same complex might migrate to the membrane where the PTEN substrate is localized.

DTIC

Biochemistry; Cancer; Prostate Gland; Proteins; Purification

20070013220 Beth Israel Deaconess Medical Center, Boston, MA USA

Role of PAK6 in Prostate Cancer

Kaur, Ramneet; Oct 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0865

Report No.(s): AD-A463363; No Copyright; Avail.: CASI: [A03](#), Hardcopy

PAK6 is a serine threonine kinase whose expression is increased in prostate cancer. We have tried to understand the role played by PAK6 in PCa by finding its interacting partners. We have developed a strategy to find its interacting partners by tagging the protein with triple FLAG epitope, immunoprecipitating the protein using FLAG beads, elution by using triple FLAG peptide, running the eluted material on the gel, silver staining the gel and then mass spectrometry analysis is done on the specific bands. By this approach we have found nucleolin to be PAK6 interacting protein. Nucleolin is involved in cellular proliferation and it has also a role to play in cancer. Our another finding has shown that PAK6 is activated by MKK6 and p38 MAP kinase, so it implies PAK6 has some role to play under stress conditions. Nucleolin is also phosphorylated by p38 and its RNA binding ability increases under genotoxic stress depicting link between two findings. Another important potential partners of PAK6 found by this strategy are IQGAP1 and PP2C.

DTIC

Cancer; Prostate Gland

20070013226 McGill Univ., Montreal, Quebec Canada

ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis

Muller, William J; Apr 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0244

Report No.(s): AD-A463399; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The induction of human breast cancer involves the complex interplay of hormones and growth factor receptors. The major focus of our DOD sponsored research program is to investigate the interaction of the ER and erbB-2 receptor in the induction of breast cancer. In addition, we studied the involvement of ErbB-2 coupled signaling pathways such as c-Src in ER induced mammary tumorigenesis. To accomplish this, we derived and characterized transgenic mice that expressed high levels of ER in the mammary epithelium. To explore the significance of ErbB-2 and c-Src in mammary tumor progression, we generated cohorts of bigenic mice expressing MMTV-ER along with ErbB-2, c-Src or Akt-1. The results of these analyses did not show any influence of the expression of an activated form of ER on ErbB-2 induced mammary tumor formation. No evidence of c-Src or Akt-1 acting synergistically with ER to accelerate mammary tumor progression has been observed either.

DTIC

Breast; Cancer; Crosstalk; Mammary Glands; Metastasis

20070013227 Kimmel (Sidney) Cancer Center, San Diego, CA USA

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer

Van Drogen, Audrey; Spruck, Charles H; Nov 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0063

Report No.(s): AD-A463404; No Copyright; Avail.: CASI: [A02](#), Hardcopy

This study investigates the role of a newly identified gene called hCDC4 in prostate cancer. The hCDC4/FBXW7 gene encodes a protein that functions in a cellular process called proteolysis, or protein degradation. hCdc4 degrades a protein called cyclin E1, which is a central component of the cell division machinery. Cyclin E1 is involved in initiating DNA replication in cells. However, in many types of human tumors cyclin E1 protein level is aberrant and this phenotype has been shown in vitro and in vivo to be oncogenic. Very little is known regarding cyclin E1/hCdc4 in prostate tumors. We are exploring whether hCDC4/FBXW7 functions as a tumor suppressor gene in prostate cancer. We have completed a genetic screen of prostate tumors and found an hCDC4/FBXW7 gene mutation. We have shown that this mutant hCdc4 cannot bind cyclin E1 substrate in vivo and mislocalizes in cells. We are currently exploring the effects of hCDC4/FBXW7 knockdown in prostate cancer progression and identifying substrates of dysregulation of cyclin E1 kinase activity due to hCDC4/FBXW7 inactivation using protein array technology.

DTIC

Cancer; Genes; Genome; In Vivo Methods and Tests; Prostate Gland; Suppressors; Tumor Suppressor Genes

20070013229 Georgetown Univ., Washington, DC USA

Endocrine Therapy of Breast Cancer

Clarke, Robert; Jun 2006; 36 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0570

Report No.(s): AD-A463407; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A recent controversy in the treatment of estrogen receptor positive (ER+) breast cancers is whether an aromatase inhibitor, e.g., letrozole (LET) or TAM should be given as first line endocrine therapy. Unfortunately, response rates are lower, and response durations are shorter, on crossover than when these agents are given as first line therapies, e.g., -40% of tumors show cross resistance to TAM or an aromatase inhibitor on crossover. Only 50% of ER+ tumors respond to endocrine therapy. Currently, we fail to predict endocrine responsiveness in about 66% of ER+/PgR- (progesterone receptor), 55% of ER-/PgR+, and 25% of ER+/PgR+ tumors. In this new Clinical Translational Research Award, we hypothesize that our analytical methods can extract expression profiles of breast tumors that define their responsiveness (sensitive vs. resistant) to endocrine therapy. These profiles, when combined with known predictive/prognostic factors, will support neural network and biostatistical classifiers or committee machines that predict each tumor's endocrine responsiveness. Our objectives are to array breast cancer cases, build classifiers of endocrine responsiveness (using microarray data), and validate these classifiers in independent data sets using mostly immunohistochemistry data (IHC). IHC will be done on cases with definitive outcomes data. In the long term, we will design custom arrays for use in clinical practice. Genes will be further studied using cellular and molecular methods, and their role as therapeutic targets explored.

DTIC

Breast; Cancer; Endocrinology; Mammary Glands; Therapy

20070013230 Kentucky Univ., Lexington, KY USA

Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma

Allred, Clinton D; Kilgore, Michael W; Dec 2006; 26 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0532

Report No.(s): AD-A463408; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Stark differences in the actions of linoleic acid (LAA) an omega-6 fatty acid and eicosapentaenoic acid (EPA) an omega-3 fatty acid on breast cancer tumors have been described. We propose that transactivation of peroxisome proliferators-activated receptor gamma (PPAR γ) mediates the physiological effects of different dietary fatty acids on breast cancer. PPAR γ plays a role in the development and progression of breast cancer tumors. We have shown that individual ligands of PPAR γ can selectively activate PPAR γ in three different ways. Selective activation of PPAR γ by a single ligand occurs between tissue types and between individual breast cancer cell lines. Also unique ligands selectively activate PPAR γ within a single cell type. We propose that fatty acids will elicit their effects on breast cancer cells in a similar manner. Using both pharmaceutical and molecular approaches we have demonstrated that PPAR γ serves as a molecular target for both LAA and EPA. Our data shows that fatty acids utilize PPAR γ to activate a PPAR response element reporter system and that the receptor is both sufficient and

necessary to observe this response. Also EPA treatment increases the ability of PPAR γ to bind to DNA. Furthermore through multiple approaches we have determined that fatty acids do not need to be converted to prostaglandins but themselves can function as PPAR γ ligands. To date we have determined that both LAA and EPA act as PPAR γ agonists. The objective of future studies will be to demonstrate that LAA and EPA act as selective PPAR γ modulators (SPARMs) in breast cancer cells. We hypothesize that though both LAA and EPA are PPAR γ agonists they function as SPARMs by causing unique gene expression and that this is in part the mechanism responsible for the different physiological actions of these fatty acids. Most recently we have demonstrated that rosiglitazone a PPAR γ ligand also serves as an agonist of the estrogen receptor in breast cancer cells.

DTIC

Breast; Cancer; Diets; Fatty Acids; Mammary Glands; Modulation

20070013231 Johns Hopkins Univ., Baltimore, MD USA

Telomere Length as a Predictor of Aggressive Prostate Cancer

Platz, Elizabeth A; Nov 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0030

Report No.(s): AD-A463411; No Copyright; Avail.: CASI: [A02](#), Hardcopy

We are evaluating whether men with shorter telomere length in prostate cancer tissue and in normal appearing prostate tissue adjacent to adenocarcinoma have a higher risk of aggressive prostate cancer than men with longer telomere length. Since the last progress report (Nov 2005) the tissue microarrays were assembled by our Harvard collaborators. At Hopkins, we completed staining of the tissue microarrays for telomere length and are in the processing of imaging the spots and estimating telomere length.

DTIC

Cancer; Prostate Gland; Risk; Telomeres

20070013235 Kimmel (Sidney) Cancer Center, San Diego, CA USA

Vectors for Treatment of Metastatic Breast Cancer

Deisseroth, Albert B; Aug 2006; 56 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0554

Report No.(s): AD-A463416; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective is to design, build and study vectors which would be able to break tolerance to breast cancer associated TAA and to be used to suppress the recurrence of metastatic breast cancer following surgical resection. The hypothesis is that by fusing the CD40 ligand stripped of its transmembrane domain and intracytoplasmic domains, to a breast cancer TAA such as the extracellular domain of the her-2-neu receptor, or the extracellular tandem repeat peptides of breast cancer associated surface glycoprotein, MUC-1 (both of which have been shown to be capable when loaded on APCs of conferring resistance to engraftment by cancer cells bearing these TAA), one can break tolerance to breast cancer. The subcutaneous injection of this vector creates infected cells as factories to secrete the CD40LTAA into the systemic circulation as well as locally for the activation and antigen loading of APCs, so that they would move to the lymph nodes all over the body to generate the CD8 dependent response against metastatic breast cancer. We also explored boosting of the vector vaccine by TAA/CD40L protein injections. This report summarizes the successful assembly and study of these vectors. These injections break tolerance to tumor associated antigens in mouse models.

DTIC

Breast; Cancer; Mammary Glands; Metastasis

20070013240 Rosalind Franklin Univ. of Medicine and Science, Chicago, IL USA

Identification of Splice Variants as Molecular Markers in Parkinson's Disease

Meredith, Gloria E; Sep 2006; 35 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0580; USPHS-NS-41799

Report No.(s): AD-A463435; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Alternative splicing is responsible for producing several products from a single transcript and can cause pathogenic changes in RNA in neurodegenerative disease. This proposal tests the hypothesis that regulation of normal splicing is disrupted in Parkinson's disease (PD). Scope: Experiments are designed to determine splicing products in the brain and blood of experimental MPTP models of PD and the blood of newly diagnosed PD patients, who are not yet on dopamine therapy. The overall goal is to use splice variants as biomarkers to identify individuals at risk for PD. To date, we have identified and quantified alternatively spliced transcripts for several candidate genes in MPTP models of PD. We have also obtained RB

permission to study splicing factors in the blood of newly diagnosed PD patients. Major Findings: Mice treated chronically with MPTP show a shift in the ratio of FosB, RGS9 and Ania6 splice variants in the striatum, 3 days post-treatment. The splicing ratios for AChE and Ania 6 also change in the blood following chronic treatment and, for Ania 6, the changed ratio persists up to 3 weeks after treatment. Progress in the first year includes 4 abstracts, a peer-reviewed publication and an article in preparation.

DTIC

Diseases; Markers

20070013244 Winston-Salem State Univ., Winston-Salem, NC USA

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women

Reddick, Bobbie; Oct 2006; 7 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0458

Report No.(s): AD-A463442; No Copyright; Avail.: CASI: A02, Hardcopy

WSSU, a designated Historically Black College and University (HBCU) is committed to resolving some of the economic, social and health problems in the community in which the university is located. Breast Cancer deaths and complication occur disproportionately in minority women than majority women within this community. This proposal is designed to develop a sustainable breast cancer training program at WSSU. Three faculty post docs and (2) faculty trainees from the SOHS are developing research skills by engaging in breast cancer research with professors at Johns Hopkins University who are experts in this area. The objectives of this training program are to allow the trainees the opportunity to develop fundable research proposals, to conduct successful clinical research projects, and to publish and to train other WSSU researchers. The faculty post docs will be able to apply their knowledge to assist minority elderly women to learn how to discover signs of cancer before the cancer becomes hard to treat. Consistent with year 4 objectives, the faculty post docs have attended several training activities, submitted research abstracts and grant applications, presented in scientific conferences, and are continuously designing the program for future WSSU researchers.

DTIC

Breast; Cancer; Education; Females; Mammary Glands; Mortality

20070013245 Stanford Univ., Stanford, CA USA

Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer

Moreno, Jacqueline; Oct 2006; 50 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0860

Report No.(s): AD-A463443; No Copyright; Avail.: Defense Technical Information Center (DTIC)

1,25-dihydroxyvitamin D3 (calcitriol), the active form of vitamin D3 is a hormone with anti-proliferative and prodifferentiation effects in prostate cancer (PCa) cells. Our ultimate goal is to identify novel therapeutic targets for the treatment of PCa with calcitriol. Previous to this study, we have used cDNA microarray analysis of established human PCa cell lines identifying, among others, the regulation of genes implicated in prostaglandin (PG) bioactivity. PGs are implicated in the development and progression of PCa, tumor invasiveness and tumor grade. We found that calcitriol down-regulates the expression of cyclooxygenase-2 (COX-2), enzyme that initiates PG synthesis, and up-regulates the expression of 15-hydroxyprostaglandin dehydrogenase (15-PGDH) involved in the first step in PG inactivation. In this project we analyze these two novel target genes of calcitriol. In this project we found that calcitriol reduces the expression of COX-2 mRNA and protein and up-regulates 15-PGDH mRNA and protein. We also found that the combined treatment of LNCaP and PC-3 cells with calcitriol and COX inhibitors mediate synergistic growth inhibition, allowing the use of reduced doses of both drugs that still resulted in enhanced anti-proliferative activity. The actions of calcitriol to reduce COX-2 expression and to induce 15-PGDH availability would potentially constitute a pathway to reduce and/or remove active PGs thereby diminishing PCa proliferation. These findings suggest that therapy combining calcitriol and COX-2 inhibitors will increase efficacy while decreasing side-effects. We strongly believe that the major contribution and significance of this project is to pave the way in the designing of new therapeutic approaches for PCa. We propose that the combination of these already approved drugs can be brought to a clinical trial swiftly.

DTIC

Calciferol; Cancer; Prostaglandins; Prostate Gland; Therapy

20070013249 Johns Hopkins Univ., Baltimore, MD USA

Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens

Reilly, R T; Jul 2006; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0668

Report No.(s): AD-A463449; No Copyright; Avail.: CASI: [A02](#), Hardcopy

HER-2/neu (neu) transgenic mice (neu-N mice) overexpress the neu proto-oncogene in a mammary specific fashion and develop spontaneous neuexpressing mammary neoplasia. The neu-N mouse model is among the most informative pre-clinical models available for the development of vaccine strategies for the treatment and prevention of breast cancer. The goal of this proposal was to test the hypothesis that reproductive hormones can modulate immunity to breast cancer antigens in neu-N mice. We explored this hypothesis by assessing vaccine-induced anti-tumor T cell responses at discreet stages in the mouse estrous cycle, as well as during mammary gland involution. Using these assays, we were unable to demonstrate a clear link between anti-tumor immune modulation and reproductive hormones. However, we were able to make very important discoveries regarding the activation and subsequent attenuation of breast cancer-specific CD8+ cytotoxic T cells in response to vaccination. These data provide important insight into mechanisms of immune tolerance that limit anti-tumor immunity.

DTIC

Antigens; Breast; Cancer; Hormones; Mammary Glands

20070013250 Johns Hopkins Univ., Baltimore, MD USA

Genes Involved in Oxidation and Prostate Cancer Progression

Platz, Elizabeth A; Jan 2007; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0273

Report No.(s): AD-A463451; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We are evaluating whether polymorphisms in genes involved in the genesis of oxidative species the detoxification of oxidative species or the repair of oxidative DNA damage influence the risk of prostate cancer progression in men with clinically organ-confined prostate cancer. We requested a no-cost extension through 01/15/2008 to complete the genotyping component of this work. During the past year we completed locating all but 4 of the 742 (number of unique samples 524 progressor-control pairs) archived prostate samples (unaffected lymph nodes removed at prostatectomy) which was the unanticipated rate limiting step for this project. We tested the amount of tissue needed and the methods of DNA extraction from the paraffin-embedded tissue that would produce a quantity and quality of DNA that was adequate for amplification by POR. For each subject we confirmed that the nodes did not contain cancer and we took 10 cores per block. DNA extraction has been completed for a third of the samples by Bioserve. We tested the ability of the Mass Array system to give accurate genotyping calls for these paraffin-embedded samples. The remaining steps are genotyping and statistical analysis. We generated a manuscript entitled 'A Simulation Study of Control Sampling: Methods for Nested Case-Control Studies of Candidate Genes and Prostate Cancer Progression' that compares methods of control sampling for the type of progression study we are conducting to support that the approach we used yields the least biased effect estimates.

DTIC

Cancer; Genes; Oxidation; Prostate Gland

20070013251 Rochester Univ., NY USA

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival

Peterson, Derick R; Jun 2006; 26 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81WXH-04-1-0714

Report No.(s): AD-A463452; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Modern high-throughput technologies allow us to simultaneously measure the expressions of a huge number of candidate predictors, some of which are likely to be associated with survival. One difficult task is to search among an enormous number of potential predictors and to correctly identify most of the important ones, without mistakenly identifying too many spurious associations. Mere variable selection is insufficient, however, for the information from the multiple predictors must be intelligently combined and calibrated to form the final composite predictor. Many commonly used procedures over-fit the training data, miss many important predictors, or both. Although it is impossible to simultaneously adjust for a huge number of predictors in an unconstrained way, we propose a method that offers a middle ground where some partial multivariate adjustments can be made in an adaptive fashion, regardless of the number of candidate predictors. We demonstrate the performance of our proposed procedure in a simulation study within the Cox proportional hazards regression framework, and

we apply our new method to a publicly available data set to construct a novel prognostic gene signature for breast cancer survival.

DTIC

Algorithms; Breast; Cancer; Censored Data (Mathematics); Genes; Hazards; Mammary Glands; Signatures; Survival

20070013253 Johns Hopkins Univ., Baltimore, MD USA

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma

Qian, Zheng D; Oct 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0839

Report No.(s): AD-A463454; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The goal of the current grant is to investigate the potential antitumor activity of histone deacetylase inhibitor MS-275 along with the activation of TGF β signaling pathway with the restoration of TGF β receptor II. As presented in our initial proposal prostate cancer cell line LNCaP has reduced expression in TGF β RII which is due to the promoter histone deacetylation. Subsequent treatment with chromatin remodeling agent MS-275 was able to restore the expression of TGF β RII. We hypothesized that the restoration of TGF β signaling may contribute to the antitumor activity of MS-275. In the past a year and half we have focused our effort to identify the re-expression of TGF β RII in vivo and investigate the antitumor activity of MS-275 in several relevant prostate cancer model. We observed dose and time dependent upregulation of TGF β 1 and TGF β RII in LNCaP cells. A cDNA microarray of LNCaP cells (untreated vs. MS-275 treated) has been done and the data is being analyzed. We observed the antitumor activity of MS-275 in two different models of prostate cancer xenografts. Immunohistochemistry analysis of reactivation of TGF β 1 in vivo is on going.

DTIC

Cancer; Inhibitors; Prostate Gland; Restoration

20070013254 Pennsylvania Univ., Philadelphia, PA USA

Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents

Jo, Hyunil; Nov 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0092

Report No.(s): AD-A463455; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The goal of this project is to develop an efficient route to the synthesis of Eleutherobin and its analogues utilizing tandem Diels-Alder and Grob fragmentation strategy. During the first year of the grant, a highly improved synthesis of the key compound for Grob fragmentation study has been accomplished. In addition, two key fragments for an asymmetric synthesis of Eleutherobin by intramolecular Diels-Alder reaction were prepared in a very concise manner.

DTIC

Cancer; Chemotherapy; Drugs; Prostate Gland

20070013255 Wayne State Univ., Detroit, MI USA

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone

Che, Mingxin; Nie, Daotai; Aug 2006; 7 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0749

Report No.(s): AD-A463460; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Most patients dying of breast cancer suffer painful bone metastasis. It is our hypothesis that the invasive growth and progression of breast metastatic lesions in bone requires the participation of various constituents from 'soil'. A reconstitution of such 'soil' for the growth of breast metastatic cells will provide tremendous insights into factors critical for breast cancer growth in bone. We will firstly use our basic calcium minerals to reconstitute the mineral part of bone environment and then study the interaction of breast cancer cells with bone minerals. Then we will culture osteoblasts or bone marrow stromal cells on calcium phosphate scaffolds and then study the growth of breast cancer cells in this engineered bone microenvironment. Finally we will xenograft the calcium phosphate scaffolds, filled with cultured breast cancer cells, into athymic mice and study the resultant tumor growth and progression in vivo. The defined approach proposed will enable us to evaluate and define each individual components of bone for their role in the progression of breast bone metastasis.

DTIC

Bones; Breast; Cancer; Mammary Glands; Metastasis; Tissue Engineering; Tumors

20070013256 Kimmel (Sidney) Cancer Center, San Diego, CA USA

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen

Spruck, Charles H; Oct 2006; 9 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0612

Report No.(s): AD-A463461; No Copyright; Avail.: CASI: [A02](#), Hardcopy

In this proposal, we explored the potential use of ubiquitin-dependent proteolysis as a reverse genetics tool in functional genomics studies. We developed a retroviral-based system that artificially targets random cellular proteins to the proteolytic machinery for degradation. To achieve this, a randomized peptide library was linked to a segment of the F-box motif of beta-TrCP, the F-box protein that mediates the ubiquitination of I(kappa)B(alpha) and (beta)-catenin via the multimeric SCF ubiquitin ligase. The resultant chimeric proteins were expected to direct any interacting proteins that are otherwise stable, to the SCF ligase for ubiquitination. As proof of principle, we used this system in a loss-of-function in vitro assay to identify putative genes involved in breast tumor invasion. MDA-MB-231 breast tumor-derived cells were transduced with the retroviral chimera library and peptides that confer the ability to invade through an artificial extracellular matrix will be isolated using a modified Boyden chamber assay. Following multiple rounds of selection, the fusion proteins that provide invasion properties will be confirmed using tumorigenicity assays in nude mice. If successful, ubiquitination-based functional assays will undoubtedly contribute to the identification of potential protein targets for therapeutic intervention in breast cancer.

DTIC

Breast; Cancer; Genes; In Vitro Methods and Tests; Mammary Glands; Proteins; Tumors

20070013259 Michigan Univ., Ann Arbor, MI USA

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer

Duckett, Colin S; Oct 2006; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0891

Report No.(s): AD-A463464; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We have made very significant progress towards the completion of the goals proposed in this award. In the first of the two Aims, we proposed to generate cell lines in which we stably suppressed XIAP using lentiviral-based RNA interference, and subsequently to constitute XIAP expression using mutants which are incapable of suppressing caspases. While we have achieved these goals using PC-3 cells, we have encountered some issues of non-specificity when these lines are examined in xenograft models, and we are in the process of troubleshooting and examining alternative approaches to address these questions. In the second Aim, we proposed to examine XIAP expression in the TRAMP and Pten conditional transgenic murine models of prostate cancer. We have completed these studies in the TRAMP model, and found that surprisingly, there is little difference in the rates of tumor onset and the survival time of Xiap null mice, compared to littermate controls groups. Interestingly, there is a slight trend towards Xiap-deficient animals being more susceptible to tumors, which may have significant implications for the use of XIAP antagonists as anti-cancer agents.

DTIC

Apoptosis; Cancer; Chemotherapy; Drugs; Molecules; Prostate Gland; Targets; Therapy

20070013261 Children's Hospital Medical Center, Boston, MA USA

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries

Folkman, Judah; Puder, Mark; Bischoff, Joyce; Feb 2007; 78 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0115

Report No.(s): AD-A463467; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The three goals of this project are: (i) to discover and develop novel drugs which could prevent or reverse the vascular leak syndrome; (ii) to develop angiogenesis inhibitors which would inhibit post-operative abdominal adhesions; and, (iii) to isolate endothelial progenitor cells from blood, capable of being expanded in vitro and applied to vascular grafts. Progress has been made in each category: we have demonstrated suppression of vascular leak by Caplostatin in response to the pro-angiogenic agent VEGF; we have demonstrated that celebex has an effect on adhesion prevention, and we have two other angiogenesis inhibitors that we would now like to test; and, we have identified cells from cord blood and adult bone marrow that can substitute for mature smooth muscle cells isolated from a healthy vein.

DTIC

Abdomen; Adhesion; Angiogenesis; Arteries; Cardiovascular System; In Vitro Methods and Tests; Injuries; Leakage; Signs and Symptoms; Stem Cells; Therapy

20070013263 Chicago Univ., Chicago, IL USA

The Role of Capase-8 in Breast Carcinoma Cells

Schickel, Robert; Peter, Marcus E; Apr 2006; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0200

Report No.(s): AD-A463469; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Breast cancer is the second leading cause of cancer related death for women in the USA. Interestingly, breast cancer cells often highly express the Fas (CD95/APO-1) receptor, which is well established as an activator of apoptosis (programmed cell death) upon ligand binding. Fas induces apoptosis by recruiting proteins that form the death inducing signaling complex (DISC). Type I cells form large amounts of the DISC and internalize Fas, whereas in Type II cells Fas does not internalize and the DISC is almost undetectable. Additionally the Fas receptor has recently been shown to activate the nonapoptotic NF- κ B and MAP kinase pathways upon receptor stimulation in either Type I or Type II cells. We can now demonstrate that in Type I cells the recruitment of DISC largely occurs after the receptor has moved into an endosomal compartment and blocking internalization prevents formation of the DISC. Receptor internalization is not required for NF- κ B and Erk1/2 activation. Consequently dimerization of Fas complexes does not induce internalization of Fas nor apoptosis but is sufficient to induce nonapoptotic-signaling pathways and increases motility and invasiveness of tumor cells. Monomeric Fas binding is not sufficient to activate nonapoptotic playways. Furthermore, we can demonstrate SNARK's role as a nonapoptotic kinase and promoter of motility and invasion.

DTIC

Apoptosis; Breast; Cancer; Mammary Glands

20070013267 Washington Univ., Seattle, WA USA

Superoxide Dismutase and Transcription Factor *sox9* as Mediators of Tumor Suppression by *mac25* (IGFBP-rp1) in Prostate Cancer Cells

Plymate, Stephen R; Oct 2006; 52 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0051

Report No.(s): AD-A463476; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The most significant conclusion that is going to be derived from the work on this proposal is the relationship of tumor cell contribution to the extra cellular environment and tumor growth. This was unexpected when we started this proposal and this work has not been completed. However, based on the findings generated in this DOD proposal Dr. Plymate has received a 5 yr NCI/NIH U54 Program Project to further develop these interactions.

DTIC

Cancer; Enzyme Activity; Inorganic Peroxides; Prostate Gland; Tumors

20070013268 Pennsylvania State Univ., University Park, PA USA

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women

Williams, Nancy I; Aug 2005; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-01-1-0361

Report No.(s): AD-A463477; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This proposal entitled Effects of moderate aerobic exercise combined with caloric restriction on circulating estrogens and IGF- 1 in premenopausal women examined the effects of exercise training combined with caloric restriction, resulting in weight loss, on two hormonal biomarkers for breast cancer i.e., circulating estrogens and insulin-like growth factor I (IGF-I). In 33 women who completed the study, exercise 4 X per wk at 79.6 % of maximal heart rate combined with a 32% decrease in caloric intake over four menstrual cycles produced significant increases in aerobic capacity (27.5%), decreases in body weight loss ranging from 1-9 kg, and loss of body fat ranging from 5 to 12% of initial percent fat. Light conditioning resulted in significant gains in aerobic capacity (30.5%), but only produced a trend toward a decrease in body fat percent (-1.2%), and only a small change in body weight (-0.8 kg). Despite the highly significant changes in body composition and body weight in the exercising group, preliminary results indicate no significant changes in serum estradiol or serum estrone. IGF-I did not change significantly either, indicating that chronic exercise and dieting do not result in favorable changes in two hormonal biomarkers for breast cancer in this age group.

DTIC

Aerobes; Circulation; Estrogens; Females; Heart Rate; Heat Measurement; Hormones; Menstruation; Physical Exercise; Rhythm (Biology); Weight Reduction

20070013269 Texas Univ. Health Science Center, San Antonio, TX USA

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer

Boka, Valerie; Mar 2007; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0325

Report No.(s): AD-A463478; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Sporadic breast cancer represents 90% of breast cancer patients. Mutations of both oncogenes and tumor suppressor genes often occur in spontaneous breast cancer. Specifically, tumor suppressor gene activity may be abrogated or decreased in cancer cells. Recently, a putative tumor suppressor gene, DBC2 (Deleted in Breast Cancer), was discovered that appears to be frequently mutated in sporadic breast cancer. DBC2 is suspected to be a tumor suppressor gene important for breast cancer because: 1) DBC2 expression cannot be detected in half of the spontaneous breast cancer tissues and cells tested and 2) wild-type (WT) DBC2 expressed in a breast cancer cell line, T47D, inhibited cellular proliferation while mutated DBC2 expression did not repress growth of the breast cancer cells. These data imply that mutation of DBC2 is important for the development of spontaneous breast cancer. This work serves to investigate the functional role of DBC2 in cells and mice to elucidate the function of DBC2 for tumor suppression. To this end, we have begun targeting the DBC2 allele and are constructing vectors that will express wildtype human DBC2 cDNA and altered cDNAs.

DTIC

Breast; Cancer; Carcinogens; Genes; Mammary Glands; Mice; Patients; Tumors; Viruses

20070013270 Northwestern Univ., Evanston, IL USA

Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF_Beta-Insensitive CD8+ T Cells for Treatment of Prostate Cancer

Lee, Chung; Jul 2006; 28 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0450

Report No.(s): AD-A463479; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Prostate cancer is the most common form of malignancy and is the second leading cause of cancer mortality in American men. While the medical field is able to treat locally confined prostate cancer, metastatic diseases remain to be a major medical challenge. Treatment of advanced stage tumors usually requires a systemic approach. However, conventional therapeutic approaches are only palliative at best. Therefore, new approaches are urgently needed for patients with advanced metastatic prostate cancer. The present proposal describes a novel immunotherapy program based on our understanding of the action of TGFbeta. Results of our pre-clinical studies have demonstrated that adoptive transfer of tumor-reactive TGF-beta-insensitive CD8+ T cells to hosts bearing mouse prostate tumors resulted in a complete rejection of established tumors. We observed that these CD8+ T cells were able to infiltrate into the tumor parenchyma, secrete relevant cytokines, and mediate apoptosis in tumor cells. These observations are encouraging. We propose to quickly translate this technology into a clinical setting for the treatment of patients with advanced prostate cancer. In the present application, we propose to perform all preparations so that all requirements for a clinical trial will be in place.

DTIC

Cancer; Prostate Gland; Reactivity; Tumors

20070013271 Georgetown Univ. Hospital, Washington, DC USA

A Comprehensive Postdoctoral Training Program in Breast Cancer

Dickson, Robert B; Jul 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-00-1-0271

Report No.(s): AD-A463480; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The goal of this training program is to significantly extend our existing, highly successful Doctoral Training Program in Tumor Biology and several Cancer Center mechanisms that provide traditional postdoctoral training and junior faculty career development. The program integrates faculty from the Lombardi Comprehensive Cancer Center programs in Cancer Prevention and Control and Cancer Genetics, makes use of the existing organizational structure of the Interdisciplinary Doctoral Training Program in Tumor Biology, and incorporates a multidisciplinary faculty who are devoted to research and education in breast cancer. To date, 10 fellows have been recruited into the program (6 classes) and 4 new courses of study were added to our program. Fellows have published 14 papers with 4 more in process, and 9 abstracts. Two fellows have received independent postdoctoral fellowships and 4 fellows went on to academic faculty postdoctoral and US Government jobs; the other fellows in the program continue to make good career development progress.

DTIC

Breast; Cancer; Education; Health; Mammary Glands; Personnel Development; Physicians

20070013272 Meharry Medical Coll., Nashville, TN USA

Development of the Meharry Medical College Prostate Cancer Research Program

Ukoli, Flora A M; Mar 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0229

Report No.(s): AD-A463484; No Copyright; Avail.: CASI: [A03](#), Hardcopy

African Americans (AA) are disproportionately affected by prostate cancer (PCa) for reasons including, biologic tumor differences, genetic predisposition, differential exposures, lack of access to prostate specific antigen (PSA) testing, inadequate access to health care, paucity of minority PCa investigators, and low accrual of AAs in clinical trials. We propose a research team at an HBCU to study the molecular, genetic, dietary, and body fat patterns in the pathogenesis of PCa disparity among AA and African men. There is substantial urology, oncology, epidemiology, nutrition and other expertise in both institutions, now developing this program at MMC, by training new and junior minority investigators, maintaining lasting partnership with mentors, and establish viable community network ties. One project will investigate health care seeking behavior of AA, another will investigate the role of lycopene in PCa risk, a third will look at genetic risk factors, and two studies will study the growth inhibitory effect of Thalidomide and other agents on PCa cell lines. The program has attracted graduate students, has identified, and is currently in the process of hiring a second post-doctoral fellow.

DTIC

Africa; Cancer; Medical Science; Prostate Gland; Universities

20070013279 California Univ., San Francisco, CA USA

Preclinical Mouse Models of Neurofibromatosis

Shannon, Kevin; Oct 2006; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0265

Report No.(s): AD-A463499; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This report describes the sixth year of research, and the first under this award, by a Consortium of investigators who have been continuously funded by this Program to develop, characterize, and utilize strains of mice that accurately model tumors found in persons with NF1 and NF2. This Consortium has generated many novel models of NF1 and NF2-associated tumors and has exploited these strains to investigate biologic and preclinical questions. In this fund year, the Consortium organized a scientific conferences on the on the use of mouse models of NF-associated tumors to test new therapies, which resulted in a review article that addressed this general topic with specific reference to NF. The investigators have collaborated closely with each other and have shared expertise and reagents extensively. This NF Consortium is a member of the Mouse Models of Human Cancer Consortium of the National Cancer Institute and is participating fully in the activities of the group.

DTIC

Cancer; Fibrosis; Mice

20070013280 Stanford Univ., Stanford, CA USA

Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D

Nonn, Larisa; Nov 2006; 51 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0067

Report No.(s): AD-A463500; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The original purpose of this research, as proposed in the statement of work, was to determine the mechanism by which prostate cancer (PCa) cells become resistant to the anti-tumor activity of vitamin D. The proposal focused on a PCa-specific deficiency in a key vitamin D metabolizing enzyme, 1alpha-hydroxylase (1alphaOH). During the first year, we encountered unforeseen difficulties with one of the key techniques in the original proposal. Therefore we decided to focus on vitamin D target genes, whose expression would be effected downstream of 1alphaOH bioactivation of vitamin D. Using normal human prostatic epithelial cells and prostate cancer cell lines, we examined the role of map kinase phosphatase 5 (MKP5), a recently discovered target gene of vitamin D, in mediating anti-tumor activities. MKP5 dephosphorylates/inactivates the stress activated protein kinase p38. Interestingly, in the prostate cancer cell lines LNCaP, PC-3 and DU 145, 1,25D did not up-regulate MKP5 or inactivate p38. 1,25D inhibited both UV and inflammation-induced p38 phosphorylation and downstream IL-6 production in a MKP5-dependendt manner. As inflammation emerges as a risk factor for prostate cancer, there is potential for chemoprevention by anti-inflammatory agents. We proceeded to expand upon these results and focused on MKP5 as a mediator of potentially chemopreventive anti-inflammatory activities of other phytochemicals in the prostate. Curcumin, the phytochemical found in turmeric, up-regulated MKP5, subsequently decreasing cytokine-induced p38-dependent pro-inflammatory changes in normal prostatic epithelial cells.

DTIC

Calciferol; Cancer; Prostate Gland; Tumors

20070013282 California Univ., Berkeley, CA USA

Bioavailability of TGF-Beta in Breast Cancer

Barcellos-Hoff, Mary H; Illa-Bochaca, Irineu; Aug 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0488

Report No.(s): AD-A463510; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Transforming Growth Factor beta (TGF-b) superfamily includes three isoforms designated TGF-b1, b2 and b3. All three isoforms are secreted as latent complex where the TGF-b cytokine is non-covalently associated with an isoform specific latency-associated peptide (LAP). Mature cytokine binds cell surface receptors only after release from its LAP making extracellular activation a critical regulatory point for TGF-b bioavailability. Proposed activation mechanisms include proteolysis and conformational changes. Previous work from our laboratory showed that latent TGF-b1 (LTGF-b1) is efficiently activated upon exposure to reactive oxygen species (ROS). ROS activation is restricted to the LTGF-b1 isoform. Because of the amino acid sequence differences between the three LAPs, we postulate that the specificity of this activation mechanism lies within the LAP. Furthermore, we hypothesize that the presence of a metal in the latent complex could provide a redox active center for this process. Redox mediated activation provides a novel mechanism for TGF-b participation in tissues undergoing oxidative stress. Moreover, this would allow TGF-b1 to act both as a sensor of oxidative stress within tissues as well as a transducer of that signal by binding to its cellular receptors.

DTIC

Breast; Cancer; Mammary Glands

20070013283 University of Southern California, Los Angeles, CA USA

Development of STEAP-based Vaccines for the Treatment of Prostate Cancer

Garcia-Hernandez, Maria de la L; Nov 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0032

Report No.(s): AD-A463511; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Immunotherapy may provide an alternative treatment for cancer patients, especially when tumors over-express antigens that can be recognized by immune cells. The identification of markers and therapeutic targets that are up regulated in prostate cancer has been important to design new potential treatments for prostate cancer. Among them, the recently identified six-transmembrane epithelial antigen of the prostate (STEAP) is considered an attractive target, due to its over-expression in human prostate cancer tissues. Previously we selected a prime/boost vaccination strategy (DNA/GFP-VRP) as the best scheme to induce a specific CD8 T cell response in C57BL/6 mice responsible for tumor delay in complete absence of autoimmunity development but therapeutic vaccination with mSTEAP modestly controlled the growth of established tumors. In this report we demonstrated that CD4 T cells that produced IFN γ , TNF α and IL-2 play the main role in tumor delay in model as demonstrated by using CD4- and CD8-deficient mice. Prime/boost vaccination was unable to control tumor progression in TRAMP with prostatic intraepithelial neoplasia. In a combined treatment of androgen ablation and STEAP vaccination was successful in prostate bearing TRAMP mice.

DTIC

Cancer; Prostate Gland; Vaccines

20070013299 Naval War Coll., Newport, RI USA

A Joint Medical Command --- Is It Needed to Enhance Medical Interoperability in the Modern Warfighter

McVeigh, Bruce W; May 16, 2006; 28 pp.; In English

Report No.(s): AD-A463546; No Copyright; Avail.: CASI: [A03](#), Hardcopy

As the entire Department of Defense continues to transform in the midst of a global war on terrorism, all of the Services continue to promulgate ways and means to become more expeditionary and modular in their approach to warfighting. In order to maintain relevancy, so must the service Medical Departments also find ways to enhance their benefit to the Joint Force Commander. In an era of budgetary constraints, it is apparent that the time has come to look at just how significant the formulation of a Joint Medical Command would be to the operational aspect of warfare. There have been many recent episodes of jointness in medical support on the battlefield, but nothing in doctrine supports the premise, and current service parochialisms often stand in the way of furthering this concept. This paper will look at advantages and disadvantages of joint medical support using key operational functions and the six joint health service support principles as a framework for analysis and conclusion. Many have written about benefits to peacetime healthcare, yet little exists in ways of analyzing this concept with respect to the warfighter from a joint support perspective.

DTIC

Interoperability; Medical Services; Military Operations

20070013307 Virginia Commonwealth Univ., Richmond, VA USA

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells

DeMasters, Gerald; Jul 2006; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD-17-03-1-0414

Report No.(s): AD-A463568; No Copyright; Avail.: CASI: [A03](#), Hardcopy

1,25-dihydroxyvitamin D3 (1,25(OH)₂D₃) and vitamin D3 analogs such as EB 1089 potentiate the response to ionizing radiation in breast tumor cells. The current studies address the basis for this interaction by evaluating DNA damage and repair, the impact of interference with reactive oxygen generation, the involvement of p53 and caspase 3, signaling through c-myc, as well as the induction of senescence and multiple modes of cell death. EB 1089 failed to increase the extent of radiation-induced DNA damage or to attenuate the rate of DNA repair. The reactive oxygen scavengers N-acetyl cysteine and reduced glutathione failed to protect the cells from the promotion of cell death by EB 1089 and radiation. While MCF-7 cells expressing caspase 3 demonstrated significant apoptosis with radiation alone as well as with EB 1089 followed by radiation, EB 1089 maintained its ability to confer susceptibility to radiation-induced cell killing, in large part by interference with proliferative recovery. In contrast, in breast tumor cells lacking p53, where radiation promoted extensive apoptosis and the cells failed to recover after radiation treatment, EB 1089 failed to influence the impact of radiation. EB 1089 treatment interfered with radiation-induced suppression of c-myc; however, induction of c-myc did not prevent senescence by radiation alone or radiation-induced cell death promoted by EB 1089. EB 1089 did not increase the extent of micronucleation, indicative of mitotic catastrophe, induced by radiation alone. However, EB 1089 did promote extensive autophagic cell death in the irradiated cells. Taken together, these studies suggest that the impact of EB 1089 treatment on the radiation response is related, in part, to enhanced promotion of autophagic cell death and in part to interference with the proliferative recovery that occurs with radiation alone in p53 wild-type breast tumor cells.

DTIC

Aging (Biology); Apoptosis; Breast; Calciferol; Cancer; Cells (Biology); Mammary Glands; Tumors

20070013308 California Univ., Berkeley, CA USA

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis

Krauss, Sharon W; Sep 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0789

Report No.(s): AD-A463569; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We proposed to test the novel hypothesis that protein 4.1 is of critical importance to centrosome and mitotic spindle aberrations that directly impact aspects of breast cancer pathogenesis. We characterized 4.1R, one member of the 4.1 family, as a component of mature centrosomes, major microtubule organizing structures in interphasic cells. Mature centrosomes become poles of mitotic spindles responsible for accurate segregation of duplicated chromosomes between dividing cells. We reasoned that aberrant 4.1 expression could engender defects in functions of centrosomes, mitotic spindles and in cytokinesis. We first analyzed centrosomal distributions of 4.1R in breast cancer cell lines with normal vs. hyperamplified centrosomes. We observed that 4.1R resides at only a subset of amplified centrosomes in the malignant breast cancer cell lines. Thus the hyperamplified centrosomes are not fully mature. We next directly tested effects of downregulating 4.1R expression. We identified specific RNA duplexes which silence 4.1R (RNAi). After exposing human cells to 4.1RRNAi, we characterized perturbed centrosomal functions, several classes of aberrant mitotic spindles, defects in cytokinesis and altered cell cycle progression. Thus our initial data strongly support our hypothesis. If funding can be obtained for future investigations of 4.1 in breast cancer cell lines and tissue samples, prognostic and diagnostic tests based on assessing genetic variations as well as levels of expression of this gene in individuals could be implemented. These may be as straightforward as analysis of lymphocytes isolated from patient blood samples (4.1R is expressed in lymphocytes). An understanding of the roles of 4.1 in centrosomal and spindle abnormalities characteristic of many breast cancers can also lead to identification of 4.1 or other interacting proteins as new therapeutic targets.

DTIC

Aberration; Breast; Cancer; Mammary Glands; Mitosis; Pathogenesis; Proteins; Spindles

20070013339 Texas Technological Univ., Lubbock, TX USA

Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System

Gollahon, Lauren S; Collie, Nathan; Jun 2005; 91 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0581

Report No.(s): AD-A463693; No Copyright; Avail.: CASI: [A05](#), Hardcopy

We have established a new co-culture system in which human mammary epithelial cells (HMEC) and human mammary

tumor cells (HMT) are physically grown together. We hypothesized that cells in co-culture (CC) would generate gene expression profiles different from homogeneous cell populations. In this study, cells were incubated with blue or red CellTracker Dyes and co-cultured. Our novel capture system allowed cells to be co-cultured and then quickly separated while maintaining 90% viability. Using deconvolution microscopy, co-cultured HMEC were observed to form focal, gland-like structures surrounded by TTU derived from an invasive ductal carcinoma. Using a differential trypsinization technique, cell populations were rapidly separated to perform RNA extractions performed (h2 h) in order to obtain expression profiles from still viable cells. RT2 profiler PCR Array (SuperArray) RT-PCR was utilized to analyze differential gene expression between parent cell lines and cells co-cultured. We observed that in co-culture HMEC become more cancerous compared to homogenous parent HMEC and CC - TTU exhibit gene expression profiles considered to be less cancerous than that of parent HMT. Replated CC HMEC have both gene expression profiles of CC HMEC and parent HMEC, but were more similar to CC HMEC. Replated TTU showed similar results.

DTIC

Breast; Cancer; Epithelium; Mammary Glands; Transport Properties

20070013343 Wayne State Univ., Detroit, MI USA

Examination of Potential Anti-Tumor Activity of N-Thiolated β -Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors

Dou, Q P; Aug 2006; 136 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0688

Report No.(s): AD-A463697; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Activation of the cellular apoptotic program is a current strategy for the prevention and treatment of human cancer including breast cancer. Because of the ease of synthesis and structural manipulation, small molecules with apoptosis-inducing ability have great potential to be developed into chemotherapeutic drugs. The beta-lactam antibiotics have for the past 60 years played an essential role in treating bacterial infections without causing toxic side effects in the host. We hypothesized that active N-thiolated beta-lactams can damage DNA and induce apoptosis in human breast cancer cells in nude mice. In this final report, we have first evaluated potencies of many novel synthetic beta-lactams to inhibit proliferation and induce apoptosis in human cancer cell. We then determined whether several of these beta-lactam, L1, HY2, HY14, HY15 and SC4, could damage breast tumor cell DNA and inhibit breast tumor growth in vivo. We have found that these beta-lactams inhibited growth of implanted MDA-MB-231 breast tumors in a concentration-dependent manner, associated with their DNA-damaging activities. Our studies have provided strong support for proof-of-concept of the potential use of these N-thiolated beta-lactams in breast cancer prevention and treatment.

DTIC

Antibiotics; Breast; Cancer; Deoxyribonucleic Acid; Mammary Glands; Mice; Tumors

20070013350 Thomas Jefferson Univ., Philadelphia, PA USA

Molecular Characterization of Squamous Cell Carcinomas From Recessive Dystrophic Epidermolysis Bullosa

Mahoney, My G; Rodeck, Ulrich; Uitto, Jouni; Sep 2006; 93 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0215

Report No.(s): AD-A463709; No Copyright; Avail.: CASI: [A05](#), Hardcopy

Patients with recessive dystrophic epidermolysis bullosa (ROEB) frequently present with squamous cell carcinomas (SCCs) probably as a result of chronic blistering and extensive scarring. These tumors are clinically aggressive as they metastasize readily. The metastasis-associated protein (MTA)-1, a transcription suppressor, is overexpressed in several epithelial neoplasms including SCCs. Our preliminary results demonstrate that MTA1 expression is induced by activation of the epidermal growth factor receptor (EGFR). As deregulation of EGFR signaling is frequently observed in aggressive epithelial neoplasms we propose to study the role of EGFR signaling and MTA1 expression in SCCs derived in ROEB patients. Our Specific Aims are to establish cell lines derived from SCCs in non-ROEB and ROEB patients, characterize the malignant phenotype of these cells as it relates to EGFR expression and signaling and to expression of MTA1, examine the contribution of EGFR/MTA1 to proliferation, invasiveness, and cell survival and identify EGFR dependent signaling pathways contributing to MTA1 expression in these cells. The results from this research will provide invaluable tools for future analysis of the pathology of carcinoma cells and will ascertain whether EGFR/MTA1 signaling pathways contributes significantly to the metastasis and invasiveness of SCC derived from ROEB patients.

DTIC

Cancer; Epithelium; Proteins

20070013365 Northwestern Univ., Evanston, IL USA

Immune Cells, if Rendered Insensitive to Transforming Growth Factorbeta, Can Cure Prostate Cancer

Lee, Chung; Feb 2007; 43 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0166

Report No.(s): AD-A463756; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of the current proposal is to perform immunotherapy to eradicate prostate cancer and at the same time to avoid the development of autoimmune disease. The proposal contains two tasks. The first task is a combination of IL-2 based tumor-reactive T cell adoptive therapy with the TGF-beta based gene therapy for the treatment of mouse prostate cancer. The second task is A tetracycline inducible TGF-beta based gene therapy. At the time of this report, we have completed Task 1 and three papers have been published. (Cancer Research 65:1761-1769, 2005; Prostate 66:235-247, 2006; Molecular Cancer Therapeutics 5:1733-1743, 2006). Currently, we are in the process of to conduct the final phase of the studies described in Task 2.

DTIC

Cancer; Medical Services; Prostate Gland

20070013368 Massachusetts Univ., Amherst, MA USA

Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2

Fischer, Nicholas O; Sep 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0257

Report No.(s): AD-A463828; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The interaction between MDM2 and p53 is a viable therapeutic target as overexpression of MDM2 can lead to excessive p53 degradation suppressing a cell's ability to cope with cellular insult. The goal of this research is to use recent advances in nanotechnology to develop a specific nanoparticle antagonist to disrupt the MDM2:p53 interaction. Inhibiting the interaction between p53 and MDM2 allows wild-type p53 concentrations to rise to functional levels effectively killing proliferating tumor cells. By incorporating traditional peptide inhibitors of MDM2 with mixed-monolayer protected gold cluster nanoparticles we hope to effect MDM2 denaturation on the nanoparticle surface increase peptide stability and facilitate intracellular peptide delivery. Nanoparticle characteristics such as size surface chemistry and biocompatibility may be controlled and modified for these specific applications. Our findings demonstrated that nanoparticles decorated with inhibitory peptides can be used to inhibit the MDM2:p53 interaction. Further optimization of the nanoparticles is required for successful implementation in therapeutic applications.

DTIC

Degradation; Nanoparticles; Nanotechnology; Peptides; Rescue Operations

20070013369 Tulane Univ., New Orleans, LA USA

Enhancing the Immune Response to Recombinant Plague Antigens

Clements, John D; May 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-2-0058

Report No.(s): AD-A463830; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The etiologic agent of plague is the Gram negative bacterium *Yersinia pestis*. *Y. pestis* is a concern as one of the microorganisms with potential for use against civilian or military populations as a biological warfare/ biological terrorism agent. In that case, the pneumonic form of plague would be the most likely outcome. This form of plague is particularly devastating because of the rapidity of onset, the high mortality, and the rapid spread of the disease. Immunization against aerosolized plague presents a particular challenge for vaccine developers. The studies reported herein explore the ability of a novel adjuvant, designated LT(R192G), to promote the rapid development of long-lasting, high titer antibodies against a recombinant plague antigen (F1-V) and protection in a murine model. Subsequent studies will be performed in non-human primates. Different routes of administration are examined to test the hypothesis that heterologous boosting will be more effective than homologous boosting at increasing the magnitude and/or duration of the antibody response.

DTIC

Antigens; Etiology; Immunity; Physiological Responses

20070013565 National Defense Univ., Washington, DC USA

Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield

Prior, Stephen; Prior, Susan; Jan 2007; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463073; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463073>

Current priorities in combat casualty care for U.S. forces include treating casualties as far forward as possible and providing lifesaving interventions in an increasingly lethal battlespace with reduced infrastructure and logistics. One of the key attributes of network-centric operations advanced by the Office of Force Transformation (OFT) is increased survivability for the force. OFT also noted that past improvements in survivability have been garnered from 'platform-centric' capabilities. With a new focus on network-centric capabilities it is appropriate to explore how this approach to operations and warfare may further benefit survivability in the battlespace. It has been suggested that the survivability of our troops and mission success can be improved by expanding the flow of medical information on the battlefield and throughout the chain of command. Currently available capabilities based on information technology (IT) can support this priority by developing solutions that will provide decision support tools for in-theater medical response. These technologies will provide capabilities for rapid location, diagnosis, and provisioning of effective trauma care to increase warfighter survival from battlefield injuries. Advances in civilian emergency response have demonstrated the utility of some of the candidate IT-based technologies. At the present time, access to information-based medical support is limited to vertical communication on the battlefield via the soldier with a radio. As more and more IT solutions are deployed in support of the troops, the level of information access and transmissibility will increase, offering new opportunities to enhance medical support. In a network-centric battlespace, many of these new IT-based capabilities could prove to be of great utility and ultimately may provide for even greater battlefield care for the troops and lower mortality rates during conflict.

DTIC

Casualties; Communication Networks; Emergencies; Injuries

20070013724 NASA Marshall Space Flight Center, Huntsville, AL, USA

Detecting Life and Biology-Related Parameters on Mars

Levin, Gilbert V.; Miller, Joseph D.; Straat, Patricia A.; Lodder, Robert; Hoover, Richard B.; [2007]; 13 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

An integrated, miniaturized, low-power instrument capable of the detection and early characterization of microbial life in the soil of Mars is proposed. Based on the detection and monitoring of on-going metabolism as being the surest evidence for extant life, the experiments will probe for chirality in metabolism, for circadian rhythm, and for photosynthesis. However, the instrument package will also be able to detect biosignatures and a variety of other physical and chemical parameters of the Martian surface that have significance for life. These include the presence and the physical state of water, the existence of an oxidant, the pH and the penetrability of the soil. Using the legacy of the 1976 Viking Labeled Release (LR) life detection experiment in conjunction with state-of-the-art laser diode spectral analysis, the instrument can be flown stand-alone, with or without a rover, or as part of an MSL-type mission. Sterility for experiment integrity and for planetary protection is provided.

Author

Life Sciences; Mars Surface; Soils; Biomarkers; Microorganisms; Miniaturization; Metabolism; Chirality

52

AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments, see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

20070011409 Air Force Research Lab., San Antonio, TX USA

Modeling Performance in C4ISR Sustained Operations: A Multi-level Approach

Elliott, Linda R.; Coovert, Michael D.; VBarnes, Christopher; Miller, James C; Jan 2003; 27 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462374; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462374>

In this paper, we report methodology and preliminary findings focused on the application of multi-level modeling techniques to distinguish effects of sleep loss and task demands on individual and team C4ISR decision making, coordination, and performance over time. We focus our efforts on measurement and modeling. First, we describe aspects of C4ISR scenario development, to ensure (a) psychological fidelity and operational relevance, (b) elicitation and assessment of performance constructs of interest, and (b) equivalence in scenario task demands and difficulty. Sustained operations research is challenged by the need for repeated-measures assessment, while minimizing effects of practice or experience. Second, we describe aspects of cognitive performance based on a standard cognitive test battery. Third, we describe other assessments (e.g. NEO PI

personality assessment, mood-state inventory, Stanford Sleepiness Scale, physiological indices) that will be included in an overall approach to modeling fatigue effects, using multi-level hierarchical modeling analyses.

DTIC

Command and Control; Decision Making; Performance Prediction; Sleep Deprivation

20070011491 NASA Johnson Space Center, Houston, TX, USA

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115

Wilson, J. W.; HonerzuBentrup, K.; Schurr, M. J.; Buchanan, K.; Morici, L.; Hammond, T.; Allen, P.; Baker, C.; Ott, C. M.; Nelman-Gonzalez M.; Schurr, J. R.; Pierson, D. L.; Stodieck, L.; Hing, S.; Hammond, T.; Allen, P.; Baker, C.; Parra, M.; Dumars, P.; Stefanyshyn-Piper, H. M.; Nickerson, C. A.; February 12, 2007; 1 pp.; In English; NASA HRP Investigators' Workshop, 12-14 Feb. 2007, USA; Copyright; Avail.: Other Sources; Abstract Only

Human presence in space, whether permanent or temporary, is accompanied by the presence of microbes. However, the extent of microbial changes in response to spaceflight conditions and the corresponding changes to infectious disease risk is unclear. Previous studies have indicated that spaceflight weakens the immune system in humans and animals. In addition, preflight and in-flight monitoring of the International Space Station (ISS) and other spacecraft indicates the presence of opportunistic pathogens and the potential of obligate pathogens. Altered antibiotic resistance of microbes in flight has also been shown. As astronauts and cosmonauts live for longer periods in a closed environment, especially one using recycled water and air, there is an increased risk to crewmembers of infectious disease events occurring in-flight. Therefore, understanding how the space environment affects microorganisms and their disease potential is critically important for spaceflight missions and requires further study. The goal of this flight experiment, operationally called MICROBE, is to utilize three model microbial pathogens, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, and *Candida albicans* to examine the global effects of spaceflight on microbial gene expression and virulence attributes. Specifically, the aims are (1) to perform microarray-mediated gene expression profiling of *S. typhimurium*, *P. aeruginosa*, and *C. albicans*, in response to spaceflight in comparison to ground controls and (2) to determine the effect of spaceflight on the virulence potential of these microorganisms immediately following their return from spaceflight using murine models. The model microorganisms were selected as they have been isolated from preflight or in-flight monitoring, represent different degrees of pathogenic behavior, are well characterized, and have sequenced genomes with available microarrays. In particular, extensive studies of *S. typhimurium* by the Principal Investigator, Dr. Nickerson, using ground-based analog systems demonstrate important changes in the genotypic, phenotypic, and virulence characteristics of this pathogen resulting from exposure to a flight-like environment (i.e. modeled microgravity).

Author

Gene Expression; Microgravity; Virulence; In-Flight Monitoring; Systems Engineering; International Space Station

20070011616 NASA Johnson Space Center, Houston, TX, USA

Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise

Gernhardt, Michael I.; Abercromby, Andrew; Conklin, Johnny; [2007]; 2 pp.; In English; 2007 Undersea and Hyperbaric Medical Society, 14-16 Jun. 2007, Dunkirk, MD, USA; Copyright; Avail.: Other Sources; Abstract Only

Conventional saturation decompression protocols use linear decompression rates that become progressively slower at shallower depths, consistent with free gas phase control vs. dissolved gas elimination kinetics. If decompression is limited by control of free gas phase, linear decompression is an inefficient strategy. The NASA prebreathe reduction program demonstrated that exercise during O₂ prebreathe resulted in a 50% reduction (2 h vs. 4 h) in the saturation decompression time from 14.7 to 4.3 psi and a significant reduction in decompression sickness (DCS: 0 vs. 23.7%). Combining exercise with intermittent recompression, which controls gas phase growth and eliminates supersaturation before exercising, may enable more efficient saturation decompression schedules. A tissue bubble dynamics model (TBDM) was used in conjunction with a NASA exercise prebreathe model (NEPM) that relates tissue inert gas exchange rate constants to exercise (ml O₂/kg-min), to develop a schedule for decompression from helium saturation at 400 fsw. The models provide significant prediction ($p < 0.001$) and goodness of fit with 430 cases of DCS in 6437 laboratory dives for TBDM ($p = 0.77$) and with 22 cases of DCS in 159 altitude exposures for NEPM ($p = 0.70$). The models have also been used operationally in over 25,000 dives (TBDM) and 40 spacewalks (NEPM). The standard U.S. Navy (USN) linear saturation decompression schedule from saturation at 400 fsw required 114.5 h with a maximum Bubble Growth Index (BGI(sub max)) of 17.5. Decompression using intermittent recompression combined with two 10 min exercise periods (75% VO₂ (sub peak)) per day required 54.25 h (BGI(sub max): 14.7). Combined intermittent recompression and exercise resulted in a theoretical 53% (2.5 day) reduction in decompression

time and theoretically lower DCS risk compared to the standard USN decompression schedule. These results warrant future decompression trials to evaluate the efficacy of this approach.

Author

Compressing; Decompression Sickness; Diving (Underwater); Physical Exercise; Pressure Reduction

20070011626 NASA Johnson Space Center, Houston, TX, USA

Cardiac and Vascular Function in Bedrested Volunteers: Effects of Artificial Gravity Training

Meng, M.; Platts, S.; Stenger, M.; Diedrich, A.; Schlegel, T.; Natapoff, A.; Knapp, C.; Evans, J.; April 8, 2007; 1 pp.; In English; 28th Annual International Gravitational Physiology Meeting, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

Cardiovascular effects of an artificial gravity (AG) countermeasure on deconditioned male volunteers were studied. In two groups of men we measured cardiovascular parameters at rest and in response to 30 minutes of 80 deg. head up tilt (HUT) before, at the end of, and four days following 21 days of 6 deg. head down bed rest (HDBR). One group (N=7) underwent no countermeasure while the other (N=8) received a daily, one hour, dose (2.5 gz at the foot, decreasing to 1.0 gz at the heart) of AG training on the Johnson Space Center short radius centrifuge. Cardiovascular parameters measured included heart rate, blood pressure, stroke volume, cardiac output, peripheral vascular resistance, plasma volume shifts, and vasoactive hormones. Untrained subjects exhibited shorter tilt survival (on average 8 minutes shorter) compared to trained subjects. By the end of bed rest, mean heart rate (MHR) was elevated in both groups (both supine and during tilt). In addition, treated subjects demonstrated lower, tilt-induced, increases in MHR four days following HDBR, indicating a more rapid return to pre bed rest conditions. Results from an index of autonomic balance (percentage of MHR spectral power in the respiratory frequency range) in control of heart rate are consistent with the interpretation that parasympathetic nervous system withdrawal was responsible for both tilt- and bed rest-induced increases in MHR. Our data support our pre-study hypothesis that AG treatment would lessen cardiovascular effects of deconditioning in bed rested men and suggest that AG should be further pursued as a space flight countermeasure.

Author

Artificial Gravity; Bed Rest; Cardiovascular System; Heart Function; Aerospace Medicine

20070011627 NASA Johnson Space Center, Houston, TX, USA

The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups

Caiozzo, V. J.; Haddad, F.; Lee, S.; Baker, M.; Baldwin, K. M.; April 13, 2007; 1 pp.; In English; 28th Annual International Gravitational Physiology Meeting, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

The goal of this project was to examine the effects of artificial gravity (2.5 g) on skeletal muscle strength and key anabolic/catabolic markers known to regulate muscle mass. Two groups of subjects were selected for study: 1) a 21 day-bed rest (BR) control (C) group (N=7); and 2) an AG group (N=8), which was exposed to 21 days of bed-rest plus daily 1 hr exposures to AG (2.5 g). This particular experiment was part of an integrated AG Pilot Project sponsored by NASA/Johnson Space Center. The in vivo torque-velocity relationships of the knee extensors and plantar flexors of the ankle were determined pre and post treatment. Also, pre- and post treatment biopsy samples were obtained from both the vastus lateralis and soleus muscles and were used, in part, for a series of analyses on gene expression (mRNA abundance) of key factors implicated in the anabolic versus catabolic state of the muscle. Post/Pre torque-velocity determinations revealed greater decrements in knee extensor performance in the C versus AG group (P less than 0.04). The plantar flexor muscle group of the AG subjects actually demonstrated a net gain in torque-velocity relationship; whereas, in the C group the overall post/pre responses declined (AG vs C; P less than 0.001). Measurements of muscle fiber cross-sectional area (for both muscles) demonstrated a loss of approx. 20% in the C group while no losses were evident in the AG group. RT-PCR analyses of muscle biopsy specimens demonstrated that markers of growth and cytoskeletal integrity (IGF-1, IGF-1 BP4, mechano growth factor, total RNA, and pro-collagen 3a) were higher in the AG group, whereas catabolic markers (myostatin and atrogen) were elevated in the C group. Importantly, these patterns were seen in both muscles. Based on these observations we conclude that paradigms of AG have the potential to maintain the functional, biochemical, and structural homeostasis of skeletal muscle in the face of chronic unloading states. These findings also warrant further studies since it is likely that other robust paradigms of AG that employ various exercise strategies may be more effective in counteracting long duration unloading states as anticipated on the platforms of the Moon and Mars.

Author

Artificial Gravity; Bed Rest; Flexors; Musculoskeletal System; Knee (Anatomy)

20070011759 NASA Johnson Space Center, Houston, TX, USA

International Multidisciplinary Artificial Gravity (IMAG) Project

Laurini, Kathy; March 7, 2007; 12 pp.; In English; Senior Management Steering Committee Meeting, 7 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: <http://hdl.handle.net/2060/20070011759>

This viewgraph presentation reviews the efforts of the International Multidisciplinary Artificial Gravity Project. Specifically it reviews the NASA Exploration Planning Status, NASA Exploration Roadmap, Status of Planning for the Moon, Mars Planning, Reference health maintenance scenario, and The Human Research Program.

CASI

Artificial Gravity; International Cooperation; Health; Risk

20070011760 NASA Johnson Space Center, Houston, TX, USA

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function

Schlegel, T. T.; Platts, S.; Stenger, M.; Ribeiro, C.; Natapoff, A.; Howarth, M.; Evans, J.; [2007]; 1 pp.; In English; International Gravitational Physiology Meeting, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

To study the effects of 21 days of head-down bed rest (HDBR), with versus without an artificial gravity (AG) countermeasure, on cardiac autonomic and advanced electrocardiographic function. Fourteen healthy men participated in the study: seven experienced 21 days of HDBR alone ('HDBR controls') and seven the same degree and duration of HDBR but with approximately 1hr daily short-arm centrifugation as an AG countermeasure ('AG-treated'). Five minute supine high-fidelity 12-lead ECGs were obtained in all subjects: 1) 4 days before HDBR; 2) on the last day of HDBR; and 3) 7 days after HDBR. Besides conventional 12-lead ECG intervals and voltages, all of the following advanced ECG parameters were studied: 1) both stochastic (time and frequency domain) and deterministic heart rate variability (HRV); 2) beat-to-beat QT interval variability (QTV); 3) T-wave morphology, including signal-averaged T-wave residua (TWR) and principal component analysis ratios; 4) other SAECG-related parameters including high frequency QRS ECG and late potentials; and 5) several advanced ECG estimates of left ventricular (LV) mass. The most important results by repeated measures ANOVA were that: 1) Heart rates, Bazett-corrected QTc intervals, TWR, LF/HF power and the alpha 1 of HRV were significantly increased in both groups (i.e., by HDBR), but with no relevant HDBR*group differences; 2) All purely 'vagally-mediated' parameters of HRV (e.g., RMSSD, HF power, Poincare SD1, etc.), PR intervals, and also several parameters of LV mass (Cornell and Sokolow-Lyon voltages, spatial ventricular activation times, ventricular gradients) were all significantly decreased in both groups (i.e., by HDBR), but again with no relevant HDBR*group differences; 3) All 'generalized' or 'vagal plus sympathetic' parameters of stochastic HRV (i.e., SDNN, total power, LF power) were significantly more decreased in the AG-treated group than in the HDBR-only group (i.e., here there was a relevant HDBR*group difference); and 4) QTV index was also significantly more changed (increased) in the AG-treated group than in the HDBR-only group, although this was clearly due to a greater decrease in generalized HRV and not to a greater increase in QTV proper because there was no relevant HDBR*group effect for either the SDNN or the RMSSD of QTV. Brief daily AG treatment by short-arm centrifuge during each of 21 days of HDBR does not appear to protect against HDBR-related losses of cardiac autonomic function or of LV mass as estimated by ECG.

Author

Artificial Gravity; Countermeasures; Heart; Heart Function; Heart Rate; Head Down Tilt; Bed Rest; Cardiology

20070011775 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets

Philippens, I. H. C. H. M.; Vanwersch, R. A. P.; Jongasma, M. J.; Groen, B.; Bouwman, B. M.; November 2006; 7 pp.; In Dutch
Contract(s)/Grant(s): TNO Proj. 014.12840

Report No.(s): TNO-DV-2006-A270; TD2006-0058; Copyright; Avail.: Other Sources

Napping before duty may be a good strategy to prevent performance decline during periods in which we normally sleep. However, operational factors may prevent the onset and maintenance of restful sleep. Therefore, hypnotics can be beneficial. Since immediate performance after premature waking can be required in a military setting it is important that hypnotics do not result in post-nap hangovers. After validation of the marmoset model, the effect of hypnotics in the late afternoon on performance during late evening, night and early morning was tested. The results showed that a nap induced by zolpidem was at least equally effective as spontaneous napping in counteracting the sleep deprivation induced decline in performance. No

residual effects of the hypnotic were found. A nap induced by zaleplon was also effective in counteracting the decline in performance. Temazepam showed some efficacy in counteracting the sleep deprivation induced decline in performance, but was not as effective as zolpidem and zaleplon. On the other hand, literature suggests that zolpidem leads to residual sleepiness in women which limits the applicability of the drug. This might indicate that for the management of sleep in military operations the hypnotic zaleplon should be preferred over zolpidem and temazepam

Author

Alertness; Drugs; Sleep; Hypnosis; Human Performance

20070012317 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Sleep and Alertness Management, 1, Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys

Philippens, I. H. C. H. M.; Oostdijk, J. P.; Pleijsier, K.; Busker, R. W.; Bouwman, B. M.; Jongsma, M. J.; Vanwersch, R. A. P.; October 2006; 7 pp.; In Dutch

Contract(s)/Grant(s): TNO Proj. 014.12840

Report No.(s): TNO-DV-2006-A268; TD2006-0056; Copyright; Avail.: Other Sources

The use of sleep-inducing and wake-promoting drugs can have direct usefulness in crew endurance plans. However, any pharmacological intervention may result in unwanted side-effects. Therefore, for sleep and alertness management in a military setting a combination of a short acting hypnotic drug and a fast acting stimulant drug are preferred. Therefore, the pharmacokinetics of the hypnotic drugs temazepam, zolpidem and zaleplon, and the alertness enhancers flumazenil, caffeine and modafinil were investigated to determine whether they fulfill the prerequisites of short and fast action to allow the use of these drugs during military service. In order to attain this goal, sensitive and selective methods of sample preparation and analysis (HPLC and GC-MS) were developed by using high quality separation and detection methods. The present study shows that the marmoset monkey is a valid model for measuring the pharmacokinetic effects of fast sleep inducing and alertness enhancing drugs. Furthermore, the results indicate that, in marmosets as well as in human, zaleplon and caffeine might possess the most favourable pharmacokinetics for sleep- and alertness management. However, despite possessing the most favourable pharmacokinetics for sleep- and alertness management, it does not necessarily mean that these two drugs are also the most effective drugs.

Author

Alertness; Pharmacology; Sleep; Stimulants; Sedatives

20070012342 NASA Johnson Space Center, Houston, TX, USA

A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression

Van Liew, H. D.; Conkin, Johnny; [2007]; 1 pp.; In English; Undersea and Hyperbaric Medical Society Annual Meeting, 14-16 Jun. 2007, Maui, HI, USA

Contract(s)/Grant(s): NNJ06HG25A; Copyright; Avail.: CASI: A01, Hardcopy

Do gaseous micronuclei trigger the formation of bubbles in decompression sickness (DCS)? Most previous instructions for DCS prevention have been oriented toward supersaturated gas in tissue. We are developing a mathematical model that is oriented toward the expected behavior of micronuclei. The issue is simplified in altitude decompressions because the aviator or astronaut is exposed only to decompression, whereas in diving there is a compression before the decompression. The model deals with four variables: duration of breathing of 100% oxygen before going to altitude (O₂ prebreathing), altitude of the exposure, exposure duration, and rate of ascent. Assumptions: a) there is a population of micronuclei of various sizes having a range of characteristics, b) micronuclei are stable until they grow to a certain critical nucleation radius, c) it takes time for gas to diffuse in or out of micronuclei, and d) all other variables being equal, growth of micronuclei upon decompression is more rapid at high altitude because of the rarified gas in the micronuclei. To estimate parameters, we use a dataset of 4,756 men in altitude chambers exposed to various combinations of the model's variables. The model predicts occurrence of DCS symptoms quite well. It is notable that both the altitude chamber data and the model show little effect of O₂ prebreathing until it lasts more than 60 minutes; this is in contrast to a conventional idea that the benefit of prebreathing is directly due to exponential washout of tissue nitrogen. The delay in response to O₂ prebreathing can be interpreted as time required for outward diffusion of nitrogen; when the micronuclei become small enough, they are disabled, either by crushing or because they cannot expand to a critical nucleation size when the subject ascends to altitude.

Author

Decompression Sickness; Mathematical Models; Nucleation; Microstructure; High Altitude

20070012343 NASA Johnson Space Center, Houston, TX, USA

Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity
Pollock, N. W.; Natoli, M. J.; Vann, R. D.; Gernhardt, M. L.; Conkin, Johnny; [2007]; 2 pp.; In English; Undersea and hyperbaric Medical Society Annual Meeting, 14-16 Jun. 2007, Maui, HI, USA
Contract(s)/Grant(s): NNNJ06HG25A; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Prebreathe Reduction Program (PRP) used exercise during oxygen prebreathe to reduce necessary prebreathe time prior to depressurizing to work in a 4.3 psi suit during extravehicular activity (EVA). Initial testing produced a two-hour protocol incorporating ergometry exercise and a 30 min cycle of depress/repress to 10.2 psi where subjects breathed 26.5% oxygen/balance nitrogen (Phase II - 10 min at 75% peak oxygen consumption [VO₂ peak] followed by 40 min intermittent light exercise [ILE] [approx. 5.8 mL-per kilogram- per minute], then 50 min of rest). The Phase II protocol (0/45 DCS) was approved for operations and has been used on 40 EVAs, providing significant time savings compared to the standard 4 h resting oxygen prebreathe. The Phase V effort focused on performing all light in-suit exercise. Two oxygen prebreathe protocols were tested sequentially: V-4) 160 min prebreathe with 150 min of continuous ILE. The entire protocol was completed at 14.7 psi. All exercise involved upper body effort. Exercise continued until decompression. V-5) 160 min prebreathe with 140 min of ILE - first 40 min at 14.7 psi, then 30 min at 10.2 psi (breathing 26.5% oxygen) after a 20 min depress, simulating a suit donning period. Subjects were then repressed to 14.7 psi and performed another 50 min of lower body ILE, followed by 50 min rest before decompression. The V-4 protocol was rejected with 3 DCS/6 person-exposures. Initial V-5 testing has produced 0 DCS/11 person-exposures (ongoing trials). The difference in DCS rate was significant (Fisher Exact p=0.029). The observations of DCS were significantly lower in early V-5 trials than in V-4 trials. Additional studies are required to evaluate the relative contribution of the variables in exercise distribution, the 10.2 psi depress/repress component, pre-decompression rest, or possible variation in total oxygen consumption.

Author

Extravehicular Activity; Microgravity; Oxygen Consumption; Physical Exercise; Protocol (Computers)

20070012857 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendmiddelen in marmosetapen)
Oct 2006; 55 pp.; In English; Original contains color illustrations
Report No.(s): AD-A462999; TNO-DV-2006-A268; No Copyright; Avail.: CASI: [A04](#), Hardcopy
ONLINE: <http://hdl.handle.net/100.2/ADA462999>

In earlier studies, possible solutions with direct usefulness in crew endurance plans were recommended; among the recommendations was the use of sleep-inducing and wake-promoting drugs. However, any pharmacological intervention may result in unwanted side-effects. Therefore, for sleep and alertness management in a military setting a combination of a short acting hypnotic drug and a fast acting stimulant drug are preferred. Human pharmacokinetics are usually well-known for approved drugs. However, if these drugs are to be used in a novel animal model setting (the marmoset), pharmacokinetics will be different and need to be re-assessed. Therefore, in this study, the pharmacokinetics of the short acting hypnotic drugs temazepam, zolpidem and zaleplon, and the alertness enhancers flumazenil, caffeine and modafinil were investigated to determine whether they fulfill the prerequisites of short and fast action to allow the use of these drugs in aiding sleep and enhancing alertness during military service. In order to attain this goal, sensitive and selective methods of sample preparation and analysis (HPLC and (IC-MS) were developed by using high quality separation and detection methods. The blood samples were obtained using a low-stress protocol which makes the use of an anesthetic unnecessary. This also prevents possible intervention with the anesthetic drug with the drugs under investigation.

DTIC

Alertness; Drugs; Monkeys; Pharmacology; Sedatives; Sleep; Sleep Deprivation

20070012869 Air Force Research Lab., Wright-Patterson AFB, OH USA

Human Neck Response during Vertical Impact with Variable Weighted Helmets
Doczy, Erica J; Pelletiere, Joseph A; Gallagher, Hilary L; Sep 2006; 85 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A463024; AFRL-HE-WP-TR-2006-0147; No Copyright; Avail.: CASI: [A05](#), Hardcopy
ONLINE: <http://hdl.handle.net/100.2/ADA463024>

Helmet-mounted systems, such as night vision goggles and helmet-mounted displays, are designed to enhance pilot performance; however, they may also affect pilot safety during ejection due to the change in helmet inertial properties. The weight of a helmet, along with a pilot's bracing ability, can affect the human response and potential for neck injury during

impact. A useful tool for investigating the mechanics of bracing and the relationships to helmet weight and impact acceleration is electromyography (EMG). Twenty-four male and female volunteer subjects participated in this study on the Vertical Deceleration Tower (VDT), located at WPAFB. The VDT produced a vertical acceleration with a half sine wave pulse of 150ms duration; peak accelerations ranged from 6 to 10 G. Helmet weights were 3.0, 4.0 and 5.0 lbs. Surface EMG was collected on the left and right sternocleidomastoid (SCM) and trapezius using DelSys surface EMG sensors. Neck loads were calculated using measured head accelerations and inertial property data. Neck load significantly increased with an increase in helmet weight. Neck muscle activity was reported in %MVC (maximum voluntary contraction). A method of collecting neck muscle activity data from the trapezius and SCM during short-duration impact experiments was successfully developed. A better understanding of the relationship between bracing and injury potential can be used to develop detailed instructions for pilots during their training to reduce their injury potential through proper positioning and bracing in the event of an ejection.

DTIC

Helmets; Human Reactions; Impact Acceleration

20070012887 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets

Philippens, I H; Vanwersch, R A; Jongsma, M J; Groen, B; Bouwman, B M; Nov 2006; 27 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-014.12840

Report No.(s): AD-A463054; TNO-DV-2006-A270; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463054>

It was already shown that napping before duty may be a good strategy to prevent performance decline during periods in which the circadian rhythm indicates the need to sleep. However, in a military setting, operational factors may prevent the onset and/or maintenance of restful sleep. In this case the use of hypnotics can be beneficial. Since immediate performance after premature waking can be required in a military setting it is important to choose hypnotics that do not result in so-called post-nap hangovers. In this study, the marmoset monkey model was validated as a model for testing the effects of drugs on performance during time shift work as is the case in many military operations. Subsequently, the effect of hypnotics in the late afternoon on performance during late evening, night and early morning missions was tested. It was proven that the homeostasis in marmoset monkeys after sleep deprivation is similar to the human homeostasis: The sleep intensity after a night of sleep deprivation, which will happen during late night or early morning duty, is increased in the first hours of sleep similar to human. Furthermore, a short nap by these animals before the sleep deprivation period can prevent most detrimental effects on performance and activity, as is the case in humans. Therefore, the marmoset monkey can be considered as a valid model for testing effects of drugs affecting the sleep and alertness behavior.

DTIC

Alertness; Drugs; Military Operations; Monkeys; Morning; Night; Sleep; Sleep Deprivation

20070012915 Titan Corp., San Diego, CA USA

Overuse Injury Assessment Model

Stuhmiller, James H; Sih, Bryant L; Shen, Weixin; Amankwah, Kofi; Negus, Charles; Mar 2006; 115 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-C-0073

Report No.(s): AD-A463099; No Copyright; Avail.: CASI: A06, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463099>

This report covers progress made in the development of a model to predict both injury and performance during basic training. Previously, we developed preliminary performance enhancement and metabolic demand models to complement stress fracture models developed earlier. In this report, we describe our work in the further development of the performance model, with a focus on run performance. We also introduce a statistical prediction method to compare our model accuracy with, and describe the development of preliminary overuse and acute injury models. We further refine the software conceptual design and describe the implementation of a simplified version of the software. Additional datasets were also acquired and organized, which were used for model development and validation.

DTIC

Bones; Fractures (Materials); Injuries; Metabolism

20070012950 Johns Hopkins Univ., Laurel, MD USA

Situation Awareness and Fatigue Sensing

McKneely, Jennifer; Bevan, Matt; Cropper, Kevin; Iny, Mandy; Vaughan, Frank; Jun 2006; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463207; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463207>

SUMMARY: FY05 experiment provides indication that approach and measures are useful for assessing fatigue effects. SA appears to be affected by fatigue. FY06 data helps to solidify findings and provide foundation for C2 fatigue management. DTIC

Detection; Situational Awareness

20070013525 NASA Johnson Space Center, Houston, TX, USA

Chromosome Aberrations in Astronauts

George, Kerry A.; Durante, M.; Cucinotta, Francis A.; [2007]; 13 pp.; In English; Copyright; Avail.: CASI: [A03](#),

Hardcopy

A review of currently available data on in vivo induced chromosome damage in the blood lymphocytes of astronauts proves that, after protracted exposure of a few months or more to space radiation, cytogenetic biodosimetry analyses of blood collected within a week or two of return from space provides a reliable estimate of equivalent radiation dose and risk. Recent studies indicate that biodosimetry estimates from single spaceflights lie within the range expected from physical dosimetry and biophysical models, but very large uncertainties are associated with single individual measurements and the total sample population remains low. Retrospective doses may be more difficult to estimate because of the fairly rapid time-dependent loss of 'stable' aberrations in blood lymphocytes. Also, biodosimetry estimates from individuals who participate in multiple missions, or very long (interplanetary) missions, may be complicated by an adaptive response to space radiation and/or changes in lymphocyte survival and repopulation. A discussion of published data is presented and specific issues related to space radiation biodosimetry protocols are discussed.

Author

Chromosome Aberrations; In Vivo Methods and Tests; Astronauts; Radiation Dosage; Extraterrestrial Radiation; Biophysics

20070013528 NASA Johnson Space Center, Houston, TX, USA

Nutritional Status Assessment (SMO 016E)

Smith, S. M.; Zwart, S. R.; Heer, M.; Coburn, S. P.; Booth, S. A.; Jones, J. A.; Lupton, J.; [2007]; 1 pp.; In English; Human Research Program Investigators' Workshop, 12-14 Feb. 2007, League City, TX, USA; Copyright; Avail.: Other Sources;

Abstract Only

It has not been possible to assess nutritional status of crew members on the ISS during flight because blood and urine could not be collected during ISS missions. Postflight observations of alterations in nutritional status for several nutrients are troubling, and we require the ability to monitor the status of these nutrients during flight to determine if there is a specific impetus or timeframe for these changes. In addition to the monitoring of crew nutritional status during flight, in-flight sample collection would allow better assessment of countermeasure effectiveness. SMO 016E is also designed to expand the current medical requirement for nutritional assessment (MR016L) to include additional normative markers for assessing crew health and countermeasure effectiveness. Additional markers of bone metabolism will be measured to better monitor bone health and the effectiveness of countermeasures to prevent bone resorption. New markers of oxidative damage will be measured to better assess the type of oxidative insults that occur during space flight. The array of nutritional assessment parameters will be expanded to include parameters that will allow us to better understand changes in folate and vitamin B6 status, and related cardiovascular risk factors during and after flight. Additionally, stress hormones and hormones that affect bone and muscle metabolism will also be measured. This additional assessment will allow us to better monitor the health of crew members and make more accurate recommendations for their rehabilitation. Several nutritional assessment parameters are altered at landing, but it is not known how long these changes persist. We extended the current protocol to include an additional postflight blood and urine sample collection 30 days after landing. Data are being collected before, during, and after flight. These data will provide a complete survey of how nutritional status and related systems are affected by space flight. Analyzing the data will help us to define nutritional requirements for long-duration missions. This expanded set of measurements will also aid in the identification of nutritional countermeasures to counteract, for example, the deleterious effects of microgravity on bone and muscle and the effects of space radiation.

Author

Aerospace Medicine; Cardiovascular System; Metabolism; Nutritional Requirements; Spacecrews; Manned Space Flight; Biomarkers; Bioassay

20070013548 NASA Johnson Space Center, Houston, TX, USA

Results from an Investigation into Extra-Vehicular Activity (EVA) Training related Shoulder Injuries

Johnson, Brian J.; Williams, David F.; [2004]; 15 pp.; In English; AIAA Space 2004 Conference and Expo, 28-30 Sep. 2004, San Diego, CA, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The number and complexity of extravehicular activities (EVAs) required for the completion and maintenance of the International Space Station (ISS) is unprecedented. The training required to successfully complete this magnitude of space walks presents a real risk of overuse musculoskeletal injuries to the EVA crew population. There was mounting evidence raised by crewmembers, trainers, and physicians at the Johnson Space Center (JSC) between 1999 and 2002 that suggested a link between training in the Neutral - Buoyancy Lab (NBL) and the several reported cases of shoulder injuries. The short- and long-term health consequences of shoulder injury to astronauts in training as well as the potential mission impact associated with surgical intervention to assigned EVA crew point to this as a critical problem that must be mitigated. Thus, a multi-directorate tiger team was formed in December of 2002 led by the EVA Office and Astronaut Office at the JSC. The primary objectives of this Tiger Team were to evaluate the prevalence of these injuries and substantiate the relationship to training in the NBL with the crew person operating in the EVA Mobility Unit (EMU). Between December 2002 and June of 2003 the team collected data, surveyed crewmembers, consulted with a variety of physicians, and performed tests. The results of this effort were combined with the vast knowledge and experience of the Tiger Team members to formulate several findings and over fifty recommendations. This paper summarizes those findings and recommendations as well as the process by which these were determined. The Tiger Team concluded that training in the NBL was directly linked to several major and minor shoulder injuries that had occurred. With the assistance of JSC flight surgeons, outside consultants, and the lead crewmember/physician on the team, the mechanisms of injury were determined. These mechanisms were then linked to specific aspects of the hardware design, operational techniques, and the training environment. During the 1999 to 2003 time frame many variables converged to make it impossible to determine with any accuracy which one or two root causes were primarily involved. Therefore a broad range of recommendations was established to prevent future injury to crewmembers training in the NBL in the near term. Many of these recommendations are lessons learned that are essentially timeless and therefore should be passed on to future EVA endeavors to ensure that hardware designs and operational techniques utilized in the future consider the demands of training on the human body here on earth.

Author

Extravehicular Activity; Injuries; Shoulders; Astronaut Training; Aerospace Medicine

20070013697 NASA Johnson Space Center, Houston, TX, USA

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study

Mehta, Satish; Crusian, Brian; Pierson, Duane; Sams, Clarence; Stowe, Raymond; April 13, 2007; 2 pp.; In English; 28th Annual International Gravitational Physiology, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

Numerous studies have indicated that dysregulation of the immune system occurs during or after spaceflight. Using 21 day -6 deg. head-down tilt bed rest as a spaceflight analog, this study describes the effects of artificial gravity as a daily countermeasure on immunity, stress and reactivation of clinically important latent herpes viruses. The specific aims were to evaluate psychological and physiological stress, to determine the status of the immune system and to quantify reactivation of latent herpes viruses. Blood, saliva, and urine samples were collected from each participating subject at different times throughout the study. An immune assessment was performed on all treatment and control subjects that consisted of a comprehensive peripheral immunophenotype analysis, intracellular cytokine profiles and a measurement of T cell function. The treatment group displayed no differences throughout the course of the study with regards to peripheral leukocyte distribution, cytokine production or T cell function. Shedding of EBV and CMV was quantified by real time PCR in saliva and urine samples, respectively. There was no significant difference in CMV DNA in the treatment group as compared to the control group. EBV and VZV on the other hand showed a mild reactivation during the study. There were no significant differences in plasma cortisol between the control and treatment groups. In addition, no significant differences between antiviral antibody titers (EBV-VCA, -EA, -EBNA, CMV) or tetramer-positive (EBV, CMV) were found between the two groups. EBV DNA copies in blood were typically undetectable but never exceeded 1,500 copies per 10(exp 6) PBMCs. These data indicate that the artificial gravity countermeasure and the 21 day head-down tilt bed rest regimen had no observable adverse effect on immune function.

Author

Artificial Gravity; Viruses; Immune Systems; Cytology; Aerospace Medicine

20070013706 NASA Johnson Space Center, Houston, TX, USA

Space Exploration: Challenges in Medicine, Research, and Ethics

Davis, Jeffrey R.; April 27, 2007; 30 pp.; In English; GSBS Committee for Career Development, 27 Apr. 2007, Galveston, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013706>

This viewgraph presentation describes the challenges that space exploration faces in terms of medicine, research and ethics. The topics include: 1) Effects of Microgravity on Human Physiology; 2) Radiation; 3) Bone; 4) Behavior and Performance; 5) Muscle; 6) Cardiovascular; 7) Neurovestibular; 8) Food and Nutrition; 9) Immunology and Hematology; 10) Environment; 11) Exploration; 12) Building Block Approach; 13) Exploration Issues; 14) Life Sciences Contributions; 15) Health Care; and 17) Habitability.

CASI

Aerospace Medicine; Ethics; Space Exploration; Research and Development; Life Sciences

20070013730 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

Index of International Publications in Aerospace Medicine

Antunano, Melchor J.; Wade, Katherine; January 2007; 66 pp.; In English

Report No.(s): DOT/FAA/AM-07/2; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The 3rd edition of the Index of International Publications in Aerospace Medicine is a comprehensive listing of international publications in clinical aerospace medicine, operational aerospace medicine, aerospace physiology, environmental medicine/physiology, diving medicine/physiology, aerospace human factors, as well as other topics directly or indirectly related to aerospace medicine. The Index is divided into six major sections: I) Open Publications in General Aerospace Medicine, 11) Government Publications in General Aerospace Medicine, 111) Publications in Other Topics Related to Aerospace Medicine and Aerospace Human Factors rv) Proceedings From Scientific Meetings in Aerospace Medicine and Psychology, V) Journals, Newsletters, and Bulletins in Aerospace Medicine and Aerospace Human Factors, and VI) On-line Databases Containing Bibliographic, Regulatory, and Safety Information in Aerospace Medicine and Related Disciplines.

Author

Aerospace Medicine; Bibliographies; Indexes (Documentation)

20070013733 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

Unmanned Aircraft Pilot Medical Certification Requirements

Williams, K. W.; February 2007; 14 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): FAA-AHRR521

Report No.(s): DOT/FAA/AM-07/3; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This research study was undertaken to create recommendations for unmanned aircraft pilot medical certification requirements. The effort consisted of the convening of a panel of subject matter experts and interactions with groups engaged in the process of establishing unmanned aircraft pilot guidelines. The results of this effort were a recommendation and justification for use of the second-class medical certification.

Author

Certification; Pilotless Aircraft; Aerospace Medicine

53

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20070011483 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Soesterberg, Netherlands

Psychological Operations: The Theory of Behavioral Influence

vanderHulst, R. C.; August 2006; 7 pp.; In Dutch

Report No.(s): TD2006-0027; TNO-DV 2006-A211; Copyright; Avail.: Other Sources

Within the Defense research program V401 'Information Operations for the Army' TNO Human Factors conducts research on the knowledge-based needs and the necessary development of fundamental knowledge for PSYOPS purposes. The ultimate goal of this report was to review current developments in the scientific field of persuasion and influencing behavior.

Author

Human Factors Engineering; Military Psychology; Human Behavior

20070012396 NASA Johnson Space Center, Houston, TX, USA

An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper
Mock, Jessica; 2005; 7 pp.; In English; International Conference on Environmental Systems (ICES), 11-14 Jul. 2005, Rome, Italy

Report No.(s): 05ICES-208; Copyright; Avail.: Other Sources

Stress, fatigue, and workload affect worker performance. NSF reported that 61% of respondents state losing concentration at work while 79% occasionally or frequently made errors as a result of being fatigued. Shift work, altered work schedules, long hours of continuous wakefulness, and sleep loss can create sleep and circadian disruptions that degrade waking functions causing stress and fatigue. Review of the literature has proven void of information that links the combined effects of fatigue, stress, and workload to human performance. This paper will address which occupational factors within stress, fatigue, and workload were identified as occupational contributors to performance changes. The results of this research will be applied to underlying models and algorithms that will help predict performance changes in control room operators.

Author

Performance Prediction; Stress (Psychology); Psychological Effects; Mental Performance; Human Performance

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also *16 Space Transportation and Safety* and *52 Aerospace Medicine*.

20070011609 NASA Johnson Space Center, Houston, TX, USA

Assessing the Dangers of Moon Dust

Noble, Sarah; February 28, 2007; 26 pp.; In English; Second National Conference on USGS Human, 27 Feb. - 1 Mar. 2007, Reston, VA; Original contains color illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011609>

This viewgraph presentation reviews the sources, problems and some solutions to dust on the moon. While there appeared to be no long term effects from Lunar Dust in Apollo astronauts, the future lunar missions will be longer in duration, and therefore more problems may present themselves. Some of the se problems are reviewed, and plans to deal with them are reviewed.

CASI

Hazards; Long Term Effects; Lunar Dust; Assessments

20070011622 NASA Johnson Space Center, Houston, TX, USA

Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness

Smith, S. M.; Zwart, S. R.; Crawford, G. E.; Gillman, P. L.; LeBlanc, A.; Shackelford, L. C.; Heer, M. A.; [2007]; 1 pp.; In English; 28th Annual International Gravitational Physiology Meeting, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

The impact of microgravity on the human body is a significant concern for space travelers. We report here initial results from a pilot study designed to explore the utility of artificial gravity (AG) as a countermeasure to the effects of microgravity, specifically to bone loss. After an initial phase of adaptation and testing, 15 male subjects underwent 21 days of 6 head-down bed rest to simulate the deconditioning associated with space flight. Eight of the subjects underwent 1 h of centrifugation (AG, 1 g_z at the heart, 2.5 g_z at the feet) each day for 21 days, while 7 of the subjects served as untreated controls (CN). Blood and urine were collected before, during, and after bed rest for bone marker determinations. At this point, preliminary data are available on the first 8 subjects (6 AG, and 2 CN). Comparing the last week of bed rest to before bed rest, urinary excretion of the bone resorption marker n-telopeptide increased 95 plus or minus 59% (mean plus or minus SD) in CN but only 32 plus or minus 26% in the AG group. Similar results were found for another resorption marker, helical peptide (increased 57 plus or minus 0% and 35 plus or minus 13% in CN and AG respectively). Bone-specific alkaline phosphatase, a bone formation marker, did not change during bed rest. At this point, sample analyses are continuing, including calcium tracer kinetic studies. These initial data demonstrate the potential effectiveness of short-radius, intermittent AG as a countermeasure to the bone deconditioning that occurs during bed rest.

Author

Artificial Gravity; Bone Demineralization; Countermeasures; Weightlessness Simulation; Aerospace Medicine

20070011623 NASA Johnson Space Center, Houston, TX, USA

Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control

Paloski, William H.; Moore, S. T.; Feiveson, A. H.; Taylor, L. C.; April 8, 2007; 1 pp.; In English; 28th Annual International Gravitational Physiology Meeting, 8-13 Apr. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

While the vestibular system should be well-adapted to bed rest (a condition it experiences approximately 8/24 hrs each day), questions remain regarding the degree to which repeated exposures to the unusual gravito-inertial force environment of a short-radius centrifuge might affect central processing of vestibular information used in spatial orientation and balance control. Should these functions be impaired by intermittent AG, its feasibility as a counter-measure would be diminished. We, therefore, examined the effects of AG on spatial orientation and balance control in 15 male volunteers before and after 21 days of 6 HDT bed rest (BR). Eight of the subjects were treated with daily 1hr AG exposures (2.5g at the feet; 1.0g at the heart) aboard a short radius (3m) centrifuge, while the other seven served as controls (C). Spatial orientation was assessed by measures of ocular counter-rolling (OCR; rotation of the eye about the line of sight, an otolith-mediated reflex) and subjective visual vertical (SVV; perception of the spatial upright). Both OCR and SVV measurements were made with the subject upright, lying on their left sides, and lying on their right sides. OCR was measured from binocular eye orientation recordings made while the subjects fixated for 10s on a point target directly in front of the face at a distance of 1 m. SVV was assessed by asking subjects (in the dark) to adjust to upright (using a handheld controller) the orientation of a luminous bar randomly perturbed (15) to either side of the vertical meridian. Balance control performance was assessed using a computerized dynamic posturography (CDP) protocol similar to that currently required for all returning crew members. During each session, the subjects completed a combination of trials of sensory organization test (SOT) 2 (eyes closed, fixed platform) and SOT 5 (eyes closed, sway-referenced platform) with and without static and dynamic pitch plane head movements (plus or minus 20 deg., dynamic paced by an audible tone at 0.33Hz). OCR and CDP performance were unaffected by BR and BR+AG; post-BR measures were unchanged from baseline for both AG and C groups. Similarly, BR did not affect SVV in the C group. However, BR+AG disrupted one measure of spatial orientation: SVV error was significantly increased on R+0 and R+1 following BR in the AG group. These results suggest a transient untoward effect on central vestibular processing may accompany repeated exposure to intermittent AG, a potential side-effect that should be studied more closely in future studies.

Author

Artificial Gravity; Bed Rest; Controllers; Aerospace Medicine; Attitude (Inclination)

20070011772 NASA Johnson Space Center, Houston, TX, USA

2nd ISS Treadmill Development 'T2 Project'

MacNeill, Kevin; Wiederhoeft, Curt; March 07, 2007; 24 pp.; In English; 3rd Bi-annual Countermeasures Summit, 5-9 Mar. 2007, Houston, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy
ONLINE: <http://hdl.handle.net/2060/20070011772>

An overview of the development of a treadmill for the International Space Station is presented. Topics discussed include: flight certification of a Commercial Off the Shelf (COTS) Woodway Path treadmill; development and certification of a crew interface to optimize use of the COTS design and/or existing NASA design (such as the ARED Facebook); development and certification of a power supply to provide power from the ISS Vehicle to the treadmill system (crew interfaces, motor, controller and subject loading devices).

Derived from text

Treadmills; International Space Station; Bioastronautics

20070012323 Jacobs Sverdrup Technology, Inc., Huntsville, AL, USA

Exploration Life Support: ELS Functions and Materials Interfaces

Duffield, Bruce; [2007]; 10 pp.; In English; National Institute of Aerospace Branch Meeting, 31 Jan. - 1 Feb. 2007, Hampton, VA, USA; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: <http://hdl.handle.net/2060/20070012323>

This viewgraph presentation reviews some of the processes used to develop life support systems, and how that supports the materials that are selected. Of particular concern in the selection of materials is flammability.

CASI

Flammability; Life Support Systems; Materials Selection; Spacecraft Construction Materials

20070012807 Naval Postgraduate School, Monterey, CA USA

Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes

Verett, Marianna J; Dec 2006; 91 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462718; No Copyright; Avail.: CASI: A05, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462718>

Naval Postgraduate School's (NPS) Tactical Network Topology (TNT) experiments seek to develop, implement and identify sensor-unmanned vehicle network, and network centric operations to assist DoD warfighters in the Global War on Terrorism (GWOT). Using biometric data for rapid identification of High Value Targets (HVT) in ground and Maritime Interdiction Operations (MIO) is critical to the emerging special operation concept. The goal is to explore solutions and operational constraints associated with biometrics data analysis and rapid identification by means of ad hoc self forming sensor unmanned vehicle (UV) wireless networks. The objectives of this thesis are to look at how biometrics has performed in a testbed environment that is simulating a real special operations environment in theatre. This thesis is meant to explore and explain the biometrics process that was conducted on top of the tactical network and evaluate its performance. This thesis provided the process model for biometrics identification in the tactical networks environment. This thesis also evaluated the length of time that it took to transmit the fingerprint data from the field to the ABIS database, with an identification result then sent back to the field. The longest time that was observed was 70 minutes (using low bandwidth Satellite communications), while the shortest time was 4 minutes for reachback to ABIS and 2 minutes for a local database.

DTIC

Automatic Control; Biometrics; Test Stands; Topology

20070012874 Northrop Grumman Corp., San Antonio, TX USA

Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm

Smith, Peter A; Rogers, Bret Z; Barnes, Laura E; Jun 2006; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F41624-02-D-7003; Proj-2312

Report No.(s): AD-A463033; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463033>

This report describes four experiments in which the temporal changes in visual adaptation that occur during exposure to a train of brief, high intensity discrete light pulses (over 8 log trolands) were explored using a pulse-probe paradigm. For this, the threshold for detecting a probe light stimulus was measured at various latencies with respect to a discretely modulated (pulse) background. Experiments I and II used a 10 ms probe, and explored forward and backward masking for repetitive pulse trains (3 Hz and 10 Hz) and for single pulses. Experiments III and IV also used 3 Hz and 10 Hz pulse trains, but varied the duration of the probe stimulus. The results indicate that asymmetries in the dynamics of forward and backward masking are evident at high intensity levels, that pulse trains induce a DC shift in light adaptation mechanisms, and that stimuli presented during the backward masking window can still contribute to the detection process.

DTIC

Adaptation; Visual Perception

20070012885 Rome Univ., Rome, Italy

Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation

Di Nocera, Francesco; Camilli, Marco; Terenzi, Michela; Nacchia, Roberto; Jan 6, 2007; 40 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-05-1-3021

Report No.(s): AD-A463052; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463052>

This report results from a contract tasking University of Rome 'La Sapienza' as follows: The Grantee investigated the relation between scan path (ocular activity) and mental workload on the basis of the consideration that high workload should produce fixations grouping (because the operator needs to focus on some specific feature of the interface/task) whereas low workload should be associated with regular patterns, indicating a regular check of the interface space. According to this hypothesis, indexes providing information about the dispersion of point patterns should indicate regularity in the case of low workload and grouping in the case of high workload. The results suggest that nearest neighbor index used here is sensitive for investigating the processes underlying shifts in the level of automation, and their consequences on operator performance. On the costs of switching between levels of automation (LOA), a simple visuo-motor task employed in this study suggests that switching LOA affected individual's performance because of the cost associated with engagement/disengagement process. These findings suggest that when individuals perform a task, their cognitive systems are set to a particular level and no costs

are observed until the level (or rule) is changed. Under some circumstances the results suggest that no shift can even lead to a better performance.

DTIC

Eye (Anatomy); Eye Movements; Human Factors Engineering; Workloads (Psychophysiology)

20070012987 Naval Postgraduate School, Monterey, CA USA

A Dynamic Process Model for the Design and Assessment of Network Centric Systems

Lewis Miller, Nita; Shattuck, Lawrence G; Jun 2006; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463377; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463377>

Modern warfare has witnessed the proliferation of coalition efforts to contain terrorism. To be successful, these efforts rely upon the effective integration of human and technological agents. Typically, models and analyses of network centric warfare (NCW) focus on technological aspects of a system, eschewing the roles, contributions and decisions made by humans. The Dynamic Model of Situated Cognition (DMSC) emerged as an attempt to represent relationships between technology and humans in a system. The model has been applied in a variety of contexts: individual performance, military command and control, naval operations, human error in military mishaps, and, most recently, to modeling team behavior in complex organizations (Miller & Shattuck, 2004, 2005a, b; Shattuck & Miller, 2004, 2005; Miller, Shobe & Shattuck, 2005). During the 2004 CCRT Symposium, we introduced A Process Model of Situated Cognition in Military Command and Control. We have expanded and refined the model over the last two years and it continues to be well received. In this paper, we review these changes and extend the Dynamic Model of Situated Cognition to serve as an aid for system designers as they consider how individual and team behaviors emerge and interact with complex technology in a system context.

DTIC

Cognition; Command and Control; Dynamic Models; Man Machine Systems

20070013174 Human Effectiveness Directorate, Wright-Patterson AFB, OH USA

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library

Stanard, Terry; Wampler, Jeff; Conrad, Kendall; Osga, Glenn; Jun 2006; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463223; AFRL-WS-06-0107; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Command and Control (C2) operators require well designed human computer interfaces (HCI) to effectively perform cognitive work. However, a methodology for transforming a requirements analysis into a useful HCI design is lacking. HCI Design Patterns (HCI DP) may help bridge this 'design gap'. A set of reusable patterns known to support work functions could reduce the cost and risk associated with the design of future systems. HCI DP are an offshoot of architectural design patterns, used to catalog architectural solutions for recurring architectural design problems. Libraries of HCI DP are viewable online, but they commonly assist user interactions with generic system functions rather than actual C2 work activities. The Air Force and Navy are identifying HCI DP to assist the cognitive and collaborative work of C2 operations. Objectives include 1) Reverse engineering existing HCI designs and indexing them via cognitive work functions, 2) Developing a HCI prototyping environment embedding design patterns and indexing systems. A DOD-wide HCI DP library could promote a new set of HCI standards across the services. Future designs using a common set of patterns will promote interoperability between operators in different armed services collaborating on joint missions.

DTIC

Command and Control; Computer Design; Design Analysis; Human-Computer Interface; Libraries

20070013207 Oculus Info, Inc., Toronto, Ontario Canada

Visible Battle Rhythm

Cort, Brian; Bouchard, Alain; Gouin, Denis; Proulx, Pascale; Wright, William; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463305; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Battle rhythms are ubiquitous in military operations, but current methods for implementing them have not kept pace with the changes affecting military organizations. Visual Battle Rhythm (VBR) is a software prototype which updates the battle rhythm process with modern technology and careful information design to improve the synchronization, situational awareness and decision making ability of commanders. Key improvements over current methods include faster coordination across commands crucial for joint and coalition operations, easy distributed editing capabilities, instantaneous updates and saved

time. VBR was demonstrated at Joint Warrior Interoperability Demonstration (JWID) 2004 and exercised by the Canadian Joint Operations Group (JOG). Training required less than one hour and in both cases it received excellent evaluations. This paper describes the context and use of VBR and its potential as a deployed operational system.

DTIC

Command and Control; Computer Programs

20070013504 Jensen and Puntigam, P.S., Seattle, WA, USA

Two-Speed Manual Wheelchair Wheel

Mmeginniss, S. M.; Sabin, A.; 3 Mar 05; 15 pp.; In English

Contract(s)/Grant(s): NIH-SBIR 2 R44 HD357393

Patent Info.: Filed Filed 3 Mar 05; US-Patent-Appl-SN-11-070-996

Report No.(s): PB2007-101686; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A wheel for a manual wheelchair includes a gear assembly which is linked to the wheel and includes first and second gear ratio arrangements. A rotating shift mechanism provides the shift capability between the two gear ratios, the shift mechanism having two to six (preferably three) extended, approximately equally spaced leg members, mounted so as to rotate in a plane perpendicular to the axle between two positions. In one position of the shift assembly, the wheelchair is in a standard 1:1 gear ratio, while in another position, the wheelchair is in a lower, 2:1 gear ratio.

NTIS

Wheelchairs; Wheels; Manual Control

20070013534 NASA Johnson Space Center, Houston, TX, USA

Human Research Program: Space Human Factors and Habitability Element

Russo, Dane M.; [2007]; 1 pp.; In English; NASA Human Research Program, 12-14 Feb. 2007, League City, TX, USA;

Original contains color illustrations; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013534>

The three project areas of the Space Human Factors and Habitability Element work together to achieve a working and living environment that will keep crews healthy, safe, and productive throughout all missions -- from Earth orbit to Mars expeditions. The Advanced Environmental Health (AEH) Project develops and evaluates advanced habitability systems and establishes requirements and health standards for exploration missions. The Space Human Factors Engineering (SHFE) Project's goal is to ensure a safe and productive environment for humans in space. With missions using new technologies at an ever-increasing rate, it is imperative that these advances enhance crew performance without increasing stress or risk. The ultimate goal of Advanced Food Technology (AFT) Project is to develop and deliver technologies for human centered spacecraft that will support crews on missions to the moon, Mars, and beyond.

Author

Habitability; Human Factors Engineering; Shelters; Human Performance; Spacecrews; Food Production (In Space); Space Rations; NASA Space Programs

20070013599 National Science and Technology Council, Washington, DC USA

The National Biometrics Challenge

Aug 2006; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462649; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Government and industry have a common challenge in today's global society to provide more robust identity management tools, and identity governance principles on how to deploy these tools intelligently to meet national and international needs. Biometrics are the most definitive, real-time identity management tools currently available; however, use of the technology thus far has mainly consisted of systems designed to meet narrow objectives. To fully meet large-scale identity governance requirements, the use of biometrics technology must be made more robust, scalable and interoperable. Meeting these needs will require biometrics technology enhancements, adjustments of commercial business practices and system designs, and development of consensus on social, legal, privacy and policy considerations. Collaboration among the biometrics community government, industry and academia on these common challenges is essential. The NSTC Subcommittee on Biometrics developed this report to describe the major challenges that must be addressed by the biometrics community. Working together to overcome these challenges, the community will meet evolving operational requirements while being supported by a robust

biometrics industry. This report highlights appropriate future roles for the federal government in advancing biometrics development to meet the needs of both our Nation and the broader worldwide community.

DTIC

Biometrics; Policies; Security

20070013679 Texas A&M Univ., College Station, TX USA

Traffic Engineering Applications of Driving Simulation

Chrysler, S. T.; Williams, A. A.; Park, E. S.; Dec. 2006; 141 pp.; In English

Contract(s)/Grant(s): TDOT-10727

Report No.(s): PB2007-106881; REPT-167142-1; No Copyright; Avail.: National Technical Information Service (NTIS)

Driving simulation has primarily been used to study issues of driver distraction and to evaluate in-vehicle devices. The visualization and driver performance capabilities of simulators can be applied to more traditional traffic engineering problems as well. This project aimed to demonstrate the usefulness of a driving simulator in evaluating geometric designs for two-lane roads. Paved surface width has been shown to be correlated with crash rates and travel speeds on two lane rural roads throughout Texas. The current project examined how travel lane width, edge line striping, and shoulder width solutions affect driver errors on these roadway types. In addition, as a result of this project, the library of roadway cross-sections in the driving simulator was increased and is available for use in future studies.

NTIS

Simulation; Simulators; Traffic

59

MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

Includes general topics and overviews related to mathematics and computer science. For specific topics in these areas see *categories 60 through 67*.

20070011499 Wolf Greenfield and Sacks, PC, Boston, MA, USA

Automated Inspection and Processing System

Nelson, B. N.; Slebodnick, P.; Lemieux, E. J.; Krupa, M.; Singleton, W.; 24 Mar 03; 26 pp.; In English

Contract(s)/Grant(s): N00173-00-C-2096

Patent Info.: Filed Filed 24 Mar 03; US-Patent-Appl-SN-10-508 850

Report No.(s): PB2007-103287; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An automated inspection system is provided wherein an inspection of a surface and the processing of inspection data acquired from the surface can be performed with limited or no operator involvement and wherein a high level of consistency can be maintained between each inspection and between each processing of inspection data across multiple inspections of the surface.

NTIS

Data Processing; Inspection

20070011509 Geological Survey, Reston, VA USA, Colorado Water Conservation Board, Denver, CO, USA

Hydrostratigraphic Framework of the Raton, Vermejo, and Trinidad Aquifers in the Raton Basin, Las Animas County, Colorado

Watts, K. R.; January 2006; 37 pp.; In English

Report No.(s): PB2007-107003; USGS-SIR-2006-5129; No Copyright; Avail.: National Technical Information Service (NTIS)

Exploration for and production of coalbed methane has increased substantially in the Rocky Mountain region of the USA since the 1990s. During 1999-2004, annual production of natural gas (coalbed methane) from the Raton Basin in Las Animas County, Colorado, increased from 28,129,515 to 80,224,130 thousand cubic feet, and the annual volume of ground water coproduced by coalbed methane wells increased from about 949 million gallons to about 2,879 million gallons. Better definition of the hydrostratigraphic framework of the Raton, Vermejo, and Trinidad aquifers in the Raton Basin of southern Colorado is needed to evaluate the long-term effects of coalbed methane development on the availability and sustainability of ground-water resources.

NTIS

Aquifers; Colorado

20070011513 Oblon, Spivak, McClelland, Maier and Neustadt, P.C., Alexandria, VA, USA, Chicago Univ., Chicago, IL USA

Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images

MacMahon, H.; Armato, S. G.; 26 Nov 03; 19 pp.; In English

Contract(s)/Grant(s): USPHS-EB00341

Patent Info.: Filed Filed 26 Nov 03; US-Patent-Appl-SN-10-721 827

Report No.(s): PB2007-101617; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An apparatus, method and computer program product for performing computer aided diagnosis on temporal subtraction images of objects. A mode of a gray-level histogram is identified, and a gray-level threshold is established at a predefined fraction of this modal value. All pixels with gray levels below this threshold that lie within the lung regions of the temporal subtraction image remain 'on,' while all other pixels are set to zero. Area and circularity requirements are imposed to eliminate false-positive regions. Areas of pathologic change identified in this manner may be presented as outlines in the subtraction image or as highlighted regions in the original radiographic image so that, in effect, temporal subtraction becomes a 'background' process for computer-aided diagnosis. The present invention is also directed to method, apparatus, and computer program product for performing temporal subtraction on energy subtraction images, with or without subsequent computer aided diagnosis, of objects.

NTIS

Automatic Control; Diseases; Systems Analysis

20070011581 Lawrence Livermore National Lab., Livermore, CA USA

Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation

Bordetsky, A.; Dougan, A. D.; Nekoogar, F.; Aug. 08, 2006; 22 pp.; In English

Report No.(s): DE2006-893985; UCRL-CONF-223496; No Copyright; Avail.: National Technical Information Service (NTIS)

The paper addresses technological and operational challenges of developing a global plug-and-play Maritime Domain Security testbed for the Global War on Terrorism mission. This joint NPS-LLNL project is based on the NPS Tactical Network Topology (TNT) composed of long-haul OFDM networks combined with self-forming wireless mesh links to air, surface, ground, and underwater unmanned vehicles. This long-haul network is combined with ultra-wideband (UWB) communications systems for wireless communications in harsh radio propagation channels. LLNL's UWB communication prototypes are designed to overcome shortcomings of the present narrowband communications systems in heavy metallic and constricted corridors inside ships. In the center of our discussion are networking solutions for the Maritime Interdiction Operation (MIO) Experiments in which geographically distributed command centers and subject matter experts collaborate with the Boarding Party in real time to facilitate situational understanding and course of action selection. The most recent experiment conducted via the testbed extension to the Alameda Island exercised several key technologies aimed at improving MIO. These technologies included UWB communications from within the ship to Boarding Party leader sending data files and pictures, advanced radiation detection equipment for search and identification, biometric equipment to record and send fingerprint files to facilitate rapid positive identification of crew members, and the latest updates of the NPS Tactical Network Topology facilitating reachback to LLNL, Biometric Fusion Center, USCG, and DTRA experts.

NTIS

Computer Networks; Warfare

20070011683 National Inst. of Standards and Technology, Gaithersburg, MD USA

Technical and Economic Assessment of Internet Protocol Version 6 (IPv6)

Jan. 2006; 83 pp.; In English

Report No.(s): PB2007-106394; No Copyright; Avail.: CASI: [A05](#), Hardcopy

The Presidents National Strategy to Secure Cyberspace (National Strategy) directed the Secretary of Commerce to form a task force to examine the most recent iteration of the Internet Protocol, IP version 6 (IPv6). The President charged the task force with considering a variety of IPv6-related issues, including the appropriate role of government, international interoperability, security in transition, and costs and benefits. The Internet Protocol (IP) is an international communications standard that is essential to the operation of both the public Internet and many private networks in existence today. IP provides a standardized envelope that carries addressing, routing, and message-handling information, thereby enabling a message to be transmitted from its source to its final destination over the various interconnected networks that comprise the Internet. This report by the Department of Commerces IPv6 Task Force examines the technical and economic issues related to IPv6 adoption

in the USA, including the appropriate role of government, international interoperability, security in transition, and costs and benefits of IPv6 deployment.

NTIS

Economics; Internets; Interprocessor Communication; Protocol (Computers); Computer Security

20070011753 Lawrence Livermore National Lab., Livermore, CA USA

Improving Interpolation in BoomerAMG

Nolting, J.; Yang, U.; Sep. 11, 2006; 12 pp.; In English

Report No.(s): DE2006-894324; UCRL-TR-224345; No Copyright; Avail.: National Technical Information Service (NTIS)

With new more aggressive coarsening algorithms that while reducing memory also degrade convergence often dramatically, it was imperative that new interpolation routines be implemented to recover this degradation. The implementation details and results for three new interpolation routines, standard, extended, and F-F, are presented in this paper. The project was focused on parallel implementation, so there is little theoretical analysis. The references contain much of the algorithmic design issues and analysis, if further understanding or exploration is needed, see (1)(2)(3). It will be shown throughout this paper that long-range interpolation is needed for a number of problems, for some cases, there is almost a reduction in iterations by 2 orders of magnitude.

NTIS

Algorithms; Convergence; Degradation

20070012333 NASA Langley Research Center, Hampton, VA, USA, National Inst. of Aerospace, Hampton, VA, USA

Batch Proving and Proof Scripting in PVS

Munoz, Cesar A.; February 2007; 15 pp.; In English

Contract(s)/Grant(s): NCC1-02043; WBS 411931.02.07.07

Report No.(s): NASA/CR-2007-214546; NIA Report No. 2007-03; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012333>

The batch execution modes of PVS are powerful, but highly technical, features of the system that are mostly accessible to expert users. This paper presents a PVS tool, called ProofLite, that extends the theorem prover interface with a batch proving utility and a proof scripting notation. ProofLite enables a semi-literate proving style where specification and proof scripts reside in the same file. The goal of ProofLite is to provide batch proving and proof scripting capabilities to regular, non-expert, users of PVS.

Author

Proving; Theorems; Codes

20070013490 Lawrence Livermore National Lab., Livermore, CA USA, California Univ., Berkeley, CA, USA

Real-Time Geo-Registration of Imagery Using Cots Graphics Processors

Flath, L. M.; Kartz, M. W.; 8 Mar 06; 23 pp.; In English

Contract(s)/Grant(s): DE-W-7405-ENG-48

Patent Info.: Filed 8 Mar 06; US-Patent-Appl-SN-11-350-672

Report No.(s): PB2007-101691; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method of performing real-time geo-registration of high-resolution digital imagery using existing graphics processing units (GPUs) already found in current personal computers, rather than the main central processing unit (CPU). Digital image data captured by a camera (along with inertial navigation system (INS) data associated with the image data) is transferred to and processed by the GPU to perform the calculations involved in transforming the captured image into a geo-rectified, nadir-looking image. By using the GPU, the order-of-magnitude increase in throughput over conventional software techniques makes real-time geo-registration possible without the significant cost of custom hardware solutions.

NTIS

Computer Graphics; Imagery; Real Time Operation; Computer Programs

20070013493 Pacific Northwest National Lab., Richland, WA, USA, Illinois Univ. at Urbana-Champaign, Savoy, IL, USA

Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine

Talbott, T. D.; Schuchardt, K. L.; Stephan, E. G.; Myers, J. D.; Jul. 25, 2006; 8 pp.; In English

Contract(s)/Grant(s): AC06-76RL01830

Report No.(s): DE2006-892230; PNNL-SA-48498; No Copyright; Avail.: Department of Energy Information Bridge

Scientists, fueled by the desire for systems-level understanding of phenomena, increasingly need to share their results across multiple disciplines. Accomplishing this requires data to be annotated, contextualized, and readily searchable and translated into other formats. While these requirements can be addressed by custom programming or obviated by community standardization, neither approach has solved the problem. In this paper, we describe a complementary approach--a general capability for articulating the format of arbitrary textual and binary data using a logical data model, expressed in XML-Schema, which can be used to provide annotation and context, extract metadata, and enable translation. This work is based on the draft specification for the Data Format Description Language and our open source Defuddle parser. We present an overview of the specification, detail the design of Defuddle, and discuss the benefits and challenges of this general approach to enabling discovery and sharing of diverse data sets.

NTIS

Extraction; Format; Parsing Algorithms

20070013502 Telcordia Technologies, Inc., Piscataway, NJ, USA

Location Based Services for Integrated Cellular and LAN Networks

Lousine, M. J.; 28 Feb 05; 30 pp.; In English

Contract(s)/Grant(s): MDA904-01-C-0972

Patent Info.: Filed Filed 28 Feb 05; US-Patent-Appl-SN-11-067-984

Report No.(s): PB2007-105968; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Determining the physical location of a WLAN client includes making a request to a core network of an integrated cellular--WLAN network. Using an HLR and WLAN client identifier, the WLAN network in which the client is located is determined. A location request is then made to a MSC/SGSN servicing that WLAN network, the MSC/SGSN then forwarding the request to a gateway that interfaces the WLAN network to the core network. Alternatively, the location request is directly forwarded to the gateway. Upon receiving the request, the gateway uses a positioning procedure(s) to determine the client's physical location. This location is then returned to the core network. According to one example positioning procedure, a database containing access point physical locations is maintained. Here, a determination is made as to which access point(s) the client can communicate. The location of the access point(s), as obtained through the database, then forms a basis for the client's location.

NTIS

Local Area Networks; Patent Applications; Position (Location)

20070013503 BBNT Solutions, LLC, Cambridge, MA, USA

Methods for Wireless Mesh Multicasting

Rosenzweig, V.; Santivanez, C. A.; Weinstein, J. J.; Coffin, D. A.; 23 Mar 05; 19 pp.; In English

Contract(s)/Grant(s): DAAB07-02-C-C403

Patent Info.: Filed Filed 23 Mar 05; US-Patent-Appl-SN-11-088-45

Report No.(s): PB2007-105967; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The invention relates generally to systems, methods and/or devices for joining, generating, maintaining, and/or multicasting information via a multicast mesh.

NTIS

Patent Applications; Methodology

20070013507 Venable, LLP, Washington, DC, USA

Method and System for Extensible Position Location

Fullerton, L. W.; Roberts, M. D.; Einhorn, W. M.; Loum, K.; Dodoukh, I.; 12 Apr 05; 51 pp.; In English

Contract(s)/Grant(s): DDAB07-03-D-C213-0003

Patent Info.: Filed Filed 12 Apr 05; US-Patent-Appl-SN-11-103-438

Report No.(s): PB2007-105925; No Copyright; Avail.: CASI: [A04](#), Hardcopy

A method and system for extensible positioning that uses a primary reference node at a known first position and a secondary reference node at a second position, where a range is measured between the secondary reference node and the primary reference node. The second position is determined based upon the first position and the measured range. A second range is measured between the secondary reference node and a non-fixed node. A third position corresponding to the non-fixed node is determined based upon the second position and the second range.

NTIS

Position (Location); Methodology; Systems Engineering; Nodes (Standing Waves)

20070013509 Lawrence Livermore National Lab., Livermore, CA USA

Statistical Density Modification Using Local Pattern Matching

Terwilliger, T. C.; 8 Apr 04; 28 pp.; In English

Contract(s)/Grant(s): DE-W-7405-ENG-36

Patent Info.: Filed 8 Apr 04; US-Patent-Appl-SN-10-821-235

Report No.(s): PB2007-105924; No Copyright; Avail.: CASI: A03, Hardcopy

A computer implemented method modifies an experimental electron density map. A set of selected known experimental and model electron density maps is provided and standard templates of electron density are created from the selected experimental and model electron density maps by clustering and averaging values of electron density in a spherical region about each point in a grid that defines each selected known experimental and model electron density maps. Histograms are also created from the selected experimental and model electron density maps that relate the value of electron density at the center of each of the spherical regions to a correlation coefficient of a density surrounding each corresponding grid point in each one of the standard templates. The standard templates and the histograms are applied to grid points on the experimental electron density map to form new estimates of electron density at each grid point in the experimental electron density map.

NTIS

Pattern Recognition; Statistical Analysis; Electron Density (Concentration)

60

COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware and data processing. For components see *33 Electronics and Electrical Engineering*. For computer vision see *63 Cybernetics, Artificial Intelligence and Robotics*.

20070011769 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Catastrophic Fault Recovery with Self-Reconfigurable Chips

Zheng, Will Hua; Marzwell, Neville I.; Chau, Savio N.; October 4, 2006; 5 pp.; In English; Computational Engineering in Systems Application, 4-6 Oct. 2006, Beijing, China; Original contains color and black and white illustrations; Copyright;

Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39886>

Mission critical systems typically employ multi-string redundancy to cope with possible hardware failure. Such systems are only as fault tolerant as there are many redundant strings. Once a particular critical component exhausts its redundant spares, the multi-string architecture cannot tolerate any further hardware failure. This paper aims at addressing such catastrophic faults through the use of 'Self-Reconfigurable Chips' as a last resort effort to 'repair' a faulty critical component.

Author

Fault Tolerance; Redundancy; Failure; Space Missions

20070013703 NASA Johnson Space Center, Houston, TX, USA

Improvements to NASA's Debris Assessment Software

Opiela, J.; Johnson, Nicholas L.; [2007]; 1 pp.; In English; 58th International Astronautical Congress, 24-28 Sept. 2007, Hyderabad, India; No Copyright; Avail.: Other Sources; Abstract Only

NASA's Debris Assessment Software (DAS) has been substantially revised and expanded. DAS is designed to assist NASA programs in performing orbital debris assessments, as described in NASA's Guidelines and Assessment Procedures for Limiting Orbital Debris. The extensive upgrade of DAS was undertaken to reflect changes in the debris mitigation guidelines, to incorporate recommendations from DAS users, and to take advantage of recent software capabilities for greater user utility. DAS 2.0 includes an updated environment model and enhanced orbital propagators and reentry-survivability models. The ORDEM96 debris environment model has been replaced by ORDEM2000 in DAS 2.0, which is also designed to accept anticipated revisions to the environment definition. Numerous upgrades have also been applied to the assessment of human casualty potential due to reentering debris. Routines derived from the Object Reentry Survival Analysis Tool, Version 6 (ORSAT 6), determine which objects are assessed to survive reentry, and the resulting risk of human casualty is calculated directly based upon the orbital inclination and a future world population database. When evaluating reentry risks, the user may enter up to 200 unique hardware components for each launched object, in up to four nested levels. This last feature allows the software to more accurately model components that are exposed below the initial breakup altitude. The new DAS 2.0 provides an updated set of tools for users to assess their mission's compliance with the NASA Safety Standard and does so with a clear and easy-to-understand interface. The new native Microsoft Windows graphical user interface (GUI) is a vast

improvement over the previous DOS-based interface. In the new version, functions are more-clearly laid out, and the GUI includes the standard Windows-style Help functions. The underlying routines within the DAS code are also improved.

Author

NASA Programs; Technology Assessment; Computer Programs; Space Debris

61

COMPUTER PROGRAMMING AND SOFTWARE

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

20070011452 NASA Glenn Research Center, Cleveland, OH, USA

Process Improvement in a Radically Changing Organization

Varga, Denise M.; Wilson, Barbara M.; [2007]; 28 pp.; In English; Software Engineering Process Group Conference, 26-29 Mar. 2007, Austin, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 981155.03.03.10; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070011452>

This presentation describes how the NASA Glenn Research Center planned and implemented a process improvement effort in response to a radically changing environment. As a result of a presidential decision to redefine the Agency's mission, many ongoing projects were canceled and future workload would be awarded based on relevance to the Exploration Initiative. NASA imposed a new Procedural Requirements standard on all future software development, and the Center needed to redesign its processes from CMM Level 2 objectives to meet the new standard and position itself for CMMI. The intended audience for this presentation is systems/software developers and managers in a large, research-oriented organization that may need to respond to imposed standards while also pursuing CMMI Maturity Level goals. A set of internally developed tools will be presented, including an overall Process Improvement Action Item database, a formal inspection/peer review tool, metrics collection spreadsheet, and other related technologies. The Center also found a need to charter Technical Working Groups (TWGs) to address particular Process Areas. In addition, a Marketing TWG was needed to communicate the process changes to the development community, including an innovative web site portal.

Author

Software Engineering; Data Bases; Computer Systems Programs; Presidential Reports; Computer Programming

20070011458 Naval Research Lab., Washington, DC USA

Automatic Generation of State Invariants from Requirements Specifications

Jeffords, Ralph; Heitmeyer, Constance; Nov 1998; 15 pp.; In English

Report No.(s): AD-A462758; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Automatic generation of state invariants, properties that hold in every reachable state of a state machine model, can be valuable in software development. Not only can such invariants be presented to system users for validation, in addition, they can be used as auxiliary assertions in proving other invariants. This paper describes an algorithm for the automatic generation of state invariants that, in contrast to most other such algorithms, which operate on programs, derives invariants from requirements specifications. Generating invariants from requirements specifications rather than programs has two advantages: 1) because requirements specifications, unlike programs, are at a high level of abstraction, generation of and analysis using such invariants is easier, and 2) using invariants to detect errors during the requirements phase is considerably more cost-effective than using invariants later in software development. To illustrate the algorithm, we use it to generate state invariants from requirements specifications of an automobile cruise control system and a simple control system for a nuclear plant. The invariants are derived from specifications expressed in the SCR (Software Cost Reduction) tabular notation.

DTIC

Computer Programs; Computer Programming; Software Engineering; Cost Effectiveness

20070011470 Carnegie-Mellon Univ., Pittsburgh, PA USA

Rapid Trust Establishment for Transient Use of Unmanaged Hardware

Surie, Ajay; Perrig, Adrian; Satyanarayanan, M; Farber, David; Dec 2006; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0389; CNS-0509004

Report No.(s): AD-A462540; CMU-CS-06-176; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462540>

Transient use of PCs has grown in importance with the advent of Internet cafes and the emergence of personalization systems such as Migo, GoToMyPC, and Internet Suspend/Resume. Unfortunately, users have no choice today but to trust any transient hardware they use. They are often unaware of the risks they face in placing faith in public computers. We address this problem through Trust-Sniffer, a tool that helps a user to gain confidence in the software stack on an untrusted machine. The root of trust is a small, lightweight device such as a USB memory stick that is owned by the user. Once the integrity of the boot image is verified, Trust-Sniffer uses a staged process to expand the zone of trust. It generates a trust fault when a user first attempts to execute any binary that lies outside the current zone of trust. A trust fault handler verifies the integrity of the suspect binary by comparing its checksum with that of known good binaries. Execution stops if the binary's integrity cannot be established. This staged approach to establishing confidence in an untrusted machine strikes a good balance between the needs of security and ease-of-use, and enables rapid use of transient hardware.

DTIC

Computer Information Security; Data Processing; Operating Systems (Computers)

20070011479 President's Information Technology Advisory Committee, Arlington, VA USA

Computational Science: Ensuring America's Competitiveness

Reed, Daniel A; Bajcsy, Ruzena; Fernandez, Manuel A; Griffiths, Jose-Marie; Mott, Randall D; Dongarra, Jack; Johnson, Chris R; Inouye, Alan S; Miner, William; Matzke, Martha K; Ponick, Terry L; Jun 2005; 117 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462840; No Copyright; Avail.: CASI: [A06](#), Hardcopy

Computational science is now indispensable to the solution of complex problems in every sector, from traditional science and engineering domains to such key areas as national security, public health, and economic innovation. Advances in computing and connectivity make it possible to develop computational models and capture and analyze unprecedented amounts of experimental and observational data to address problems previously deemed intractable. Yet, despite the great opportunities and needs, universities and the Federal government have not effectively recognized the strategic significance of computational science in either their organizational structures or their research and educational planning. These inadequacies compromise U.S. scientific leadership, economic competitiveness, and national security. Universities and the Federal government's R&D agencies must make coordinated, fundamental, structural changes that affirm the integral role of computational science in addressing the 21st century's most important problems, which are predominantly multidisciplinary, multi-agency, multisector, and collaborative. To initiate the required transformation, the Federal government, in partnership with academia and industry, must also create and execute a multi-decade roadmap directing coordinated advances in computational science and its applications in science and engineering disciplines. The Federal government must rebalance R&D investments to create a new generation of well-engineered, scalable, easy-to-use software suitable for computational science that can reduce the complexity and time to solution for today's challenging scientific applications and can create accurate models and simulations that answer new questions; design, prototype, and evaluate new hardware that can deliver larger fractions of peak hardware performance on key applications; and focus on sensor- and data-intensive computational science applications in light of the explosive growth of data.

DTIC

Computer Programming; Computerized Simulation; Computers; Problem Solving; Software Engineering; United States

20070011539 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge

Dubon, Lydia P.; June 21, 2006; 15 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 16-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: <http://hdl.handle.net/2014/39806>

The Dawn GDS Team met the SC Sim integration challenge in eight months. The GDS System Engineering approach in response to the SC Simintegration challenge, focused on a set of key practices: decomposition of project request into manageable requirements; integration of multiple ground disciplines and experts into a focused team effort; risk management thru management of expectations; and aggregation of intermediate products into a final product. By maintaining a a system-level focus, the overall systems engineering process unified team GDS Team members with a common goal: the success of the ground system as a whole and not just the success of their individual expert contributions. Incorporation of Agile-type development efforts were aligned with a risk strategy based on team-oriented principles and expectations management, thus achieving a more stable baseline solution without compromising the integrity of the GDS design.

Derived from text

Systems Engineering; Ground Tests; Data Systems; Data Acquisition

20070011632 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

NASA Software Estimating Tool (N-SET)

Stukes, Sherry; June 20, 2006; 24 pp.; In English; NASA Cost Analysis Symposium, 20-22 Jun. 2006, Cleveland, OH, USA; Original contains color illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39829>

The goals of this project are to: Develop an early lifecycle software cost estimation tool leveraging existing data and capabilities Collect additional software data from: a) Jet Propulsion Laboratory; b) Goddard Space Flight Center; and c) Marshall Space Flight Center. Analyze, normalize, evaluate, stratify, and validate data. Create a calibrated, validated, and documented tool initially using available data and subsequently using newly collected data.

Derived from text

Software Development Tools; Cost Estimates; Estimating; Computer Programs

20070011729 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario

Morris, J. Richard; Ingham, Michel D.; Mishkin, Andrew H.; Rasmussen, Robert D.; Starbird, Thomas W.; June 19, 2006; 13 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39842>

State Analysis is a model-based systems engineering methodology employing a rigorous discovery process which articulates operations concepts and operability needs as an integrated part of system design. The process produces requirements on system and software design in the form of explicit models which describe the behavior of states and the relationships among them. By applying State Analysis to an actual MER flight mission scenario, this study addresses the specific real world challenges of complex space operations and explores technologies that can be brought to bear on future missions. The paper describes the tools currently used on a daily basis for MER operations planning and provides an in-depth description of the planning process, in the context of a Martian day's worth of rover engineering activities, resource modeling, flight rules, science observations, and more. It then describes how State Analysis allows for the specification of a corresponding goal-based sequence that accomplishes the same objectives, with several important additional benefits.

Author

Space Missions; Systems Engineering; Software Engineering; Flight Rules; Systems Integration

20070011734 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Construction of Protograph LDPC Codes with Linear Minimum Distance

Divsalar, Dariush; Dolinar, Sam; Jones, Christopher; July 9, 2006; 5 pp.; In English; IEEE International Symposium on Information Theory, 9-14 Jul. 2006, Seattle, WA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39825>

A construction method for protograph-based LDPC codes that simultaneously achieve low iterative decoding threshold and linear minimum distance is proposed. We start with a high-rate protograph LDPC code with variable node degrees of at least 3. Lower rate codes are obtained by splitting check nodes and connecting them by degree-2 nodes. This guarantees the linear minimum distance property for the lower-rate codes. Excluding checks connected to degree-1 nodes, we show that the number of degree-2 nodes should be at most one less than the number of checks for the protograph LDPC code to have linear minimum distance. Iterative decoding thresholds are obtained by using the reciprocal channel approximation. Thresholds are lowered by using either precoding or at least one very high-degree node in the base protograph. A family of high- to low-rate codes with minimum distance linearly increasing in block size and with capacity-approaching performance thresholds is presented. FPGA simulation results for a few example codes show that the proposed codes perform as predicted.

Author

Graphs (Charts); Decoding; Computer Programs

20070011762 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELs)

Carlton, Magdi; June 19, 2006; 11 pp.; In English; AIAA 9th International Conference on Space Operations, 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39853>

This paper presents one JPL element manager's approach to describe a complex Ground Data System (GDS) with its receivables and deliverables (REC/DEL). The Mars Reconnaissance Orbiter (MRO) Ground Data System is the integrated set of ground software, hardware, facilities and networks that support mission operation. REC/DEL is a powerful tool for specifying hierarchy of commitments among systems and teams. Receivable of a system is a deliverable of another system. Focusing on tangible products enables the manager to objectively measure progress in a schedule. Jet Propulsion Laboratory mandates the use of REC/DEL for flight projects. Tutorial and training is provided for managers to create integrated REC/DEL database using automated systems. Project schedules are based on REC/DELS. This paper is not focusing on the mechanics of REC/DEL database creation, but it provides a guideline how one systematically creates categories of deliverables and receivables for ground data system components.

Author

Ground Tests; Mars Reconnaissance Orbiter; Schedules; Complex Systems; Automatic Control; Data Processing Equipment; Data Systems; Data Acquisition

20070011763 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project

Dehghani, Navid; Tankenson, Michael; June 18, 2006; 15 pp.; In English; AIAA 9th International Conference on Space Operations, 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.:

Other Sources

ONLINE: <http://hdl.handle.net/2014/39852>

This paper details an architectural description of the Mission Data Processing and Control System (MPCS), an event-driven, multi-mission ground data processing components providing uplink, downlink, and data management capabilities which will support the Mars Science Laboratory (MSL) project as its first target mission. MPCS is developed based on a set of small reusable components, implemented in Java, each designed with a specific function and well-defined interfaces. An industry standard messaging bus is used to transfer information among system components. Components generate standard messages which are used to capture system information, as well as triggers to support the event-driven architecture of the system. Event-driven systems are highly desirable for processing high-rate telemetry (science and engineering) data, and for supporting automation for many mission operations processes.

Author

Data Processing Equipment; Flight Control; Ground Tests; Uplinking; Downlinking; Data Management; Data Acquisition; Systems Engineering

20070011765 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission

Sturdevant, Kathryn F.; Wright, Jesse J.; Lighty, Roger A.; Nakamura, Lori L.; June 19, 2006; 10 pp.; In English; AIAA 9th International Conference on Spacecraft Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39840>

This paper describes some of the challenges and lessons learned from the Deep Impact (DI) Mission Ground Data System's (GDS) telemetry data processing and product generation tool, nicknamed 'Whale.' One of the challenges of any mission is to analyze testbed and operational telemetry data. Methods to retrieve this data to date have required spacecraft subsystem members to become experts in the use of a myriad of query and plot tools. As budgets shrink, and the GDS teams grow smaller, more of the burden to understand these tools falls on the users. The user base also varies from novice to expert, and requiring them to become GDS tool experts in addition to spacecraft domain experts is an undue burden. The 'Whale' approach is to process all of the data for a given spacecraft test, and provide each subsystem with plots and data products 'automagically.'

Author

Space Missions; Telemetry; Ground Tests; Data Processing

20070011766 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Built But Not Used, Needed But Not Built: Ground System Guidance Based On Cassini-Huygens Experience

Larsen, Barbara S.; June 19, 2006; 6 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39850>

These reflections share insight gleaned from Cassini-Huygens experience in supporting uplink operations tasks with software. Of particular interest are developed applications that were not widely adopted and tasks for which the appropriate application was not planned. After several years of operations, tasks are better understood providing a clearer picture of the mapping of requirements to applications. The impact on system design of the changing user profile due to distributed operations and greater participation of scientists in operations is also explored. Suggestions are made for improving the architecture, requirements, and design of future systems for uplink operations.

Author

Systems Engineering; Computer Programs; Uplinking

20070011767 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission

Wong, Carroll; Doody, David; Heventhal, William M., III; Ibanez, John; June 19, 2006; 10 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 June 2006, Rome, Italy; Original contains black and white illustrations

Report No.(s): Rept-56940; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39849>

This paper discusses the evolution of the eCRF software from conception through deployment, challenges encountered and lessons learned, as well as current status and refinements.

Author

Cassini Mission; Deployment; Computer Programs; Distributed Parameter Systems; Software Development Tools

20070012327 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Practical Application of Model-based Programming and State-based Architecture to Space Missions

Horvath, Gregory A.; Ingham, Michel D.; Chung, Seung; Martin, Oliver; Williams, Brian; July 17, 2006; 10 pp.; In English; Space Mission Challenges for Information Technology, Pasadena, California, July 17-20, 2006, 17-20 Jul. 2006, Pasadena, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39797>

Innovative systems and software engineering solutions are required to meet the increasingly challenging demands of deep-space robotic missions. While recent advances in the development of an integrated systems and software engineering approach have begun to address some of these issues, they are still at the core highly manual and, therefore, error-prone. This paper describes a task aimed at infusing MIT's model-based executive, Titan, into JPL's Mission Data System (MDS), a unified state-based architecture, systems engineering process, and supporting software framework. Results of the task are presented, including a discussion of the benefits and challenges associated with integrating mature model-based programming techniques and technologies into a rigorously-defined domain specific architecture.

Author

Systems Engineering; Space Missions; Software Engineering; Computer Programming; Computer Systems Programs; Robotics

20070012328 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Towards a Framework for Modeling Space Systems Architectures

Shames, Peter; Skipper, Joseph; May 25, 2006; 46 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-23 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.:

Other Sources

ONLINE: <http://hdl.handle.net/2014/39798>

Topics covered include: 1) Statement of the problem: a) Space system architecture is complex; b) Existing terrestrial approaches must be adapted for space; c) Need a common architecture methodology and information model; d) Need appropriate set of viewpoints. 2) Requirements on a space systems model. 3) Model Based Engineering and Design (MBED) project: a) Evaluated different methods; b) Adapted and utilized RASDS & RM-ODP; c) Identified useful set of viewpoints; d) Did actual model exchanges among selected subset of tools. 4) Lessons learned & future vision.

Derived from text

Aerospace Systems; Systems Engineering; Architecture (Computers); Interfaces

20070012368 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Integrated, Kerberized Login on MacOS X

Hotz, Henry B.; June 12, 2006; 21 pp.; In English; AFS and Kerberos Best Practices Workshop, 12-16 Jun. 2006, Ann Arbor, MI, USA; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39809>

Context for this information. MacOS X login process and available hooks. Authorization Services configuration. Authorization Services plug-in s. Kerberos plug-in s. Other bugs and recommendations. Authorization Services Called by loginwindow, screen saver and fast user switching. It calls Directory Services, Login Hook, and Login Items (System Preferences).

Derived from text

Switching; Configuration Management; Computer Programs; Software Development Tools

20070012792 Naval Postgraduate School, Monterey, CA USA

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE)

Leong, Chris; Dec 2006; 138 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462575; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA462575>

In this thesis, we present the design of a software defined radio (SDR) transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) as the software platform. Designing a SDR requires both an appreciation of the IEEE 802.11a (wireless Local Area Network at 5 GHz band) protocol standard as well as the understanding of the C++ and CORBA software tools available to implement the physical transmitter and receiver layers. For this work, the Incremental Development Model was chosen, which is comprised of three stages: Design, Develop and Verify. The advantage of this model is its incremental nature, which allows the developer to learn from earlier versions of the system. Implementing the IEEE 802.11a physical layer using OSSIE requires a total of 23 components, 12 different functionalities and 31 sequential input-output (I/O) processes for the transmitter, while the receiver is implemented with 18 components, 12 different functionalities and 20 sequential I/O processes. The completed transmitter and receiver layers are validated successfully according to test cases stipulated in the IEEE standard.

DTIC

Computer Programming; Open Source Licensing (Computers); Software Engineering; Telecommunication; Transmitter Receivers

20070012826 Defence Science and Technology Organisation, Edinburgh, Australia

The SWANSURF Wave Model Implementation and User Manual

Christie, Georgette; Sep 2006; 59 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462948; DSTO-GD-0475; AR-013-736; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462948>

This report describes the implementation and usage of 'SWANSURF', a graphically-driven program for the modelling of waves and surf conditions in the littoral, in support of amphibious operations. The program is based on a coupling of the SWAN (Simulating Waves Nearshore) model developed by the Delft University of Technology and the SURF model (or the Navy Standard Surf Model) developed by the US Navy. The Graphical User Interface provides a platform that allows the user to easily enter inputs, run the coupled models, view the results and forecast the potential impacts of the conditions on amphibious and other littoral operations.

DTIC

Computerized Simulation; Mathematical Models; User Manuals (Computer Programs)

20070012841 Telcordia Technologies, Inc., Piscataway, NJ USA

The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems

Dasarathy, Balakrishnan; Feb 5, 2007; 16 pp.; In English

Contract(s)/Grant(s): NBCHC030132

Report No.(s): AD-A462967; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462967>

This is the final technical report on the Adaptive and Reflective Middleware Systems (ARMS) Phase II work by a team led by Telcordia. Our focus in the ARMS program is in the development of an adaptive and reflective network Quality of Service (QoS) infrastructure for the Total Ship Computing Environment (TSCE) of next generation surface ships. Our technology uses a Bandwidth Broker to provide admission control, and leverages Differentiated Services and Class of Service functionality of high-end routers and switches for enforcement. In the Phase II ARMS program, we built upon our Phase I network QoS technology to provide continued assurance of network QoS for mission-critical tasks in the presence of certain catastrophic faults such as losing an entire data center, and improve the timely adaptation to network performance with probes and instrumentation for delay.

DTIC

Adaptation; Applications Programs (Computers); Computer Networks; Real Time Operation

20070012854 Army Armament Research, Development and Engineering Center, Picatinny Arsenal, NJ USA
Engineering Model for Design of Explosive Fragmentation Munitions

Gold, Vladimir M; Feb 2007; 21 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462991; ARAET-TR-07001; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462991>

An engineering model for design of explosive fragmentation munitions presented in this work is based on integrating three-dimensional axisymmetric hydrocode analyses with analyses from a newly developed fragmentation computer code MOTT. The validation of the MOTT code fragmentation model was accomplished using the existing munition arena test data. After having established the crucial parameters of the model, a new explosive fragmentation munitions was designed and optimized. Upon fabrication of the developed munition, the performance of the new charge was tested in a series of small-scale experiments including the flash radiography, the high-speed photography, and the sawdust fragment recovery. Considering relative simplicity of the model, the accuracy of the MOTT code predictions is rather remarkable.

DTIC

Computer Programs; Fragmentation

20070012863 Engineering Technologies Associates, Inc., Ellicott City, MD USA

Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices

Sep 28, 1989; 252 pp.; In English

Contract(s)/Grant(s): DAAA15-87-D-0220-0005

Report No.(s): AD-A463009; No Copyright; Avail.: CASI: [A12](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463009>

The NODFLOW model calculates the head in the node with a pumping well. This head is not the actual head in the well, however. The head losses caused by ground water flowing to a small diameter withdrawal point are not accounted for. It is typically necessary to predict drawdown in the well as well as drawdown in the aquifer. For this reason, several new routines were written for the MODFLOW model. These routines allow the user to calculate drawdowns in the wells. These drawdowns include the effects of flow convergence and well efficiency. It is also possible to create a file of time versus drawdown at a well and have the output show an alphanumeric well name.

DTIC

Aquifers; Computer Programs; Contamination; Ground Water; Plumes

20070012864 Naval Research Lab., Washington, DC USA

Proving Noninterference and Functional Correctness Using Traces

McLean, John; Jan 1992; 21 pp.; In English

Report No.(s): AD-A463011; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463011>

The trace method of software specification is extended to provide a natural semantics for a procedural programming language. This extension provides a method for proving program correctness that permits a direct proof of program Noninterference without having to produce an intermediate finite state machine and unwinding conditions. This approach provides a uniform framework for reasoning about abstract software system specifications and their implementations. It also

allows us to prove security at an abstract level so that changes to programs that do not affect functional behavior will not affect the security proof.

DTIC

Programming Languages; Proving; Semantics

20070012875 Wright State Univ., Dayton, OH USA

Specification for Visual Requirements of Work-Centered Software Systems

Knapp, James R; Oct 2006; 117 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33601-03-F-0064; Proj-PE63231F

Report No.(s): AD-A463034; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463034>

Work-centered software systems function as inherent work-aiding systems. Based on the design concept for a work-centered support system (WCSS), these software systems support user tasks and goals through both direct and indirect aiding methods within the interface client. In order to ensure the coherent development and delivery of work-centered software products, WCSS visual interface requirements must be specified in order to capture the cognitive and work-aiding aspects of the user interface design. Without the ability to specify such original requirements, the probability of creating an accurate and effective work-centered software system is significantly reduced. A new visual requirements specification language based on the User Interface markup Language (UIML) is proposed as an effective solution to bridging this gap between cognitive systems engineering and software engineering. In this paper, a new visual requirements specification language that can capture and describe work-centered visual requirements within a semi-formal syntax is introduced and explained. The proposed language is also shown to be easily integrated into a UML object model via the use-of UML's extensibility features. Such a specification language for visual requirements could be employed by cognitive engineers and design teams to help convey requirements in a comprehensible format that is suitable for a software engineer. Such a solution provides coherency in the software-modeling process of developing work-centered software systems and contributes towards-the specification of unique visual software requirements.

DTIC

Computer Programming; Graphical User Interface; Software Engineering; Specifications; Visual Aids

20070012895 United Nations Educational, Scientific and Cultural Organization, Delft, Netherlands

XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts

Roelvink, Dano; Reniers, Ad; van Dongeren, Ap; van Thiel de Vries, Jaap; Lescinski, Jamie; Walstra, Dirk-Jan; Mar 1, 2007; 55 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N62558-06-C-2006

Report No.(s): AD-A463065; XB-NAREGCOC/2W; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463065>

This first annual report describes ongoing development and validation of the XBeach model as part of the MORPHOS project and other activities over the period 1 March 2006-1 March 2007 and provides documentation and user manual for the present version of the model.

DTIC

FORTTRAN; Hurricanes; Models; Sediment Transport; Wave Propagation

20070012913 Cardiff Univ., UK

AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications

Taylor, Ian; Adamson, Brian; Downard, Ian; Macker, Joe; Jan 2006; 9 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463096; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463096>

We present a framework, called AgentJ that extends the NS-2 platform to support the simulation and performance analysis of Java network applications. We particularly focus on the simulation of P2P networks and have already integrated the P2PS middleware for the simulation of super-peer networks for discovering participants in large scale Internet applications, which has a high significance for distributed multimedia applications to enable overlays for the discovery and searching across large numbers of distributed multimedia resources. AgentJ builds upon the numerous years of networking research with NS-2 and leverages the Protolib toolkit from NRL to facilitate the passing of real data between NS-2 nodes, thereby creating a platform for the simulation of content-based middleware and applications. AgentJ currently supports UDP unicast and multicast and

maintains compatible programming interfaces with the standard Java network package as well as the NS-2 scripting interfaces employed for staging simulations.

DTIC

C++ (Programming Language); Multimedia; Networks; Simulation; Simulators

20070012934 Bell Telephone Labs., Inc., Whippany, NJ USA

Ad-Hoc Networks and the Mobile Application Security System (MASS)

Floyd, David; Jan 2006; 14 pp.; In English

Report No.(s): AD-A463158; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463158>

Wireless tactical ad-hoc networks that use mobile applications to perform various tasks present a host of security concerns. By mobile applications, we mean applications that can support both moving nodes (e.g., receiver/transmitter on a Humvee) and migrating code (i.e., code that can transport itself via wireless link from one execution node to another). These networks, due to their wireless, open, and hostile operating environment, are more vulnerable to compromise by malicious applications and hosts than traditional networks that possess a clear line of defense. We are developing a solution to this problem that addresses critical aspects of security in ad-hoc mobile application networks. This approach involves preventing unauthorized modification of a mobile application, both by other applications and by hosts, and ensuring that mobile code is authentic and authorized. These capabilities constitute the Mobile Application Security System (MASS). The MASS applies effective, robust security to mobile application-based systems, wireless, and wired networks while minimizing overhead requirements. The MASS consists of innovative security techniques that provide distributed security solutions for mobile application networks.

DTIC

Coding; Command and Control; Networks; Security; Warning Systems

20070012936 Aptima, Inc., Woburn, MA USA

PERSUADE: Modeling Framework for the Design of Modular Army Organizations

Levchuk, Georgiy M; Levchuk, Yuri; Weil, Shawn A; Pattipati, Krishna R; Jun 2006; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911QX-06-C-0045

Report No.(s): AD-A463165; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463165>

In this paper, we present innovative approaches and algorithms for the design of Command and Control (C2) structures, mission planning, and course of action development. These models are integrated into the PERSONNEL-based Unit of Action Design Environment (PERSUADE). PERSUADE converts a textual description of mission and a graphical representation of an organization into quantitative models, and through optimization algorithms (Levchuk et al., 2002, 2004) validated in several empirical studies (Kleinman et al., 2003; Levchuk et al., 2003; Entin et al., 2003; Diedrich et al., 2003) will help the commanders at various echelons to synthesize command and control organizations tailored for a specific mission set. Our studies show that organizations designed using the PERSUADE methodology outperform their traditionally designed counterparts.

DTIC

Organizations; System Effectiveness

20070012941 Naval Postgraduate School, Monterey, CA USA

A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios

Xie, Geoffrey; Brand, Steven; Gibson, John; Jun 2006; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463175; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463175>

Currently, small ground units such as those operating in Iraq have very limited data communication capabilities between soldiers. Tactical chat or file transfer is available only at the battalion level or higher. To address this problem, the authors have developed a software application, which can leverage existing voice-centric radios to provide data services including tactical chat and file transfer capabilities to frontline ground units. The software embodies two key innovations: (1) a data link protocol to allow radios to form wireless LANs, and (2) an operation-aware ad hoc routing protocol to support reliable and

resource-efficient multi-hop message relays. This paper describes the design, implementation, and functional testing of these two protocols.

DTIC

Data Transmission; Mobile Communication Systems; Radio Equipment

20070012943 Mitre Corp., McLean, VA USA

A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control

Martinez, Carlos E; Mullins, Kenneth L; Sullivan, Karl S; Feb 17, 2006; 21 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463177; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463177>

In response to the changes in the world environment, the DoD has adopted an integrated top-down capabilities-based planning and assessment methodology in response to the shortcomings in the previous modernization process. This new methodology includes a concept development process, a capabilities-based assessment process for developmental capabilities, a Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities (DOTMLPF) requirements process for non-developmental capability changes, and a new capabilities-based acquisition process. Capabilities-based planning begins with the concept development process (Joint Concept Development and Revision Plan) including development of effects-based Joint Operations Concepts (JOC) and Joint Functional Concepts (JFC) which describe planned future capabilities. The Joint Concept Development and Revision Plan defines a capability as, 'the ability to achieve an effect to a standard under specified conditions through multiple combinations of means and ways to perform a set of tasks.' Finally, the process includes Joint Integrating Concepts (JIC) which couple one or more JOCs to one or more JFCs. The JICs identify the capability tasks with the associated performance standards needed to achieve one or more specific effects. The capabilities, associated tasks and performance standards serve as the input to the processes that establish new capabilities.

DTIC

Command and Control; Network Control; Planning; Simulation

20070012944 Air Force Experimentation Office, Langley AFB, VA USA

Operational Thread Development: A Structured Approach to Capability Analysis

Hamilton, Scott; Solterbeck, William; Wright, Jean; Mar 20, 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463185; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463185>

This paper will introduce the Operational Thread Development (OTD) methodology for analyzing warfighting capability and assessing the contribution of potential solutions to filling identified capability deficiencies. The concept of effects-driven, capabilities-based planning and analysis has dominated the military force structure planning and acquisition cycles in recent years. Recently revised documents such as CJCSI 3170.01E, Joint Capabilities and Development System, require a rigorous approach to analyzing potential solutions to warfighting capability deficiencies. However, attempting to implement this guidance in a large-scale field experiment has proven challenging. OTD is a new, structured approach to planning, designing, and analyzing a large-scale field experiment that supports the capabilities-based construct. Specifically, this paper will describe the framework for capability analysis that was used for planning Joint Expeditionary Force Experiment 2006 (JEFX 06); a process for developing, executing, and analyzing operational threads; and a web-based toolset that supports this approach.

DTIC

Software Development Tools; Threads

20070012948 Air Force Research Lab., Rome, NY USA

Net-Centric Pub/Sub Information Management Design for Command and Control

Spetka, Scott; Ramseyer, George; Tucker, Scot; Linderman, Richard; Fitzgerald, Dennis; Lok-Kwong, Yan; Jun 2006; 9 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463204; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463204>

Network-centric support for command and control (C2) communications demands interoperability and high performance. The conceptual design and semantics for netcentric C2 have been studied for several years. Recently, reference frameworks have been developed to support C2, each suggesting a net-centric approach. Two of the reference frameworks are considered

and the potential for interoperability for the net-centric architectures through experimentation is explored. Issues that affect the interoperability of the information management systems studied impact design decisions that enable network-centricity for C2 frameworks.

DTIC

Command and Control; Data Management; Information Management; Information Systems; Interoperability

20070012956 Telelogic, New York, NY USA

The Emerging Importance of Business Process Standards in the Federal Government

Popkin, Jan; Feb 23, 2006; 7 pp.; In English

Report No.(s): AD-A463264; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463264>

Today's world is increasingly defined by one term: Collaboration or the ability to share information easily using the platform of Web services. As commercial organizations evolve to a service-based technology based on application-to-application communications, they require a higher level view of how to develop and implement processes across the enterprise. Workflows tied to the automation of repeatable series of tasks are being replaced by an environment that demands an understanding of processes in the context of systems, services and the resulting task. This trend is being supported by the emergence of three trends in standards in commercial IT: the rise of the Business Process Modeling Notation standard under the OMG, the steady movement toward a services-based IT strategy using Service-Oriented Architecture (SOA), and the widespread adoption of the Business Process Execution Language (BPEL) standard. All three standards have evolved independently, but are now merging into the IT landscape to offer organizations an unparalleled opportunity to more closely align their systems and processes to their business goals. In the commercial world, these standards are propelling organizations to move from simple workflow applications to an architecture-based paradigm that supports collaboration using Web services. The maturing of these commercial standards comes at a time when defense agencies are moving to a netcentric environment where collaboration is key. These new commercial technologies can play a key role in that evolution. These standards provide the platform to facilitate use of enterprise architectures as a mechanism to facilitate collaboration for these types of decisions, whether in the area of support services, operations or war-fighting. Enterprise architectures can help defense agencies guide their IT strategy, technology investments and process improvement while ensuring their systems and processes align to their goals, mission and capabilities.

DTIC

Commerce; Network Analysis

20070012967 Air Force Research Lab., Rome, NY USA

Scenario Generation to Support Mission Planning

Gilmour, Duane A; Krause, Lee S; Lehman, Lynn A; McKeever, William E; Stirtzinger, Tony; Jun 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-03-C-0082

Report No.(s): AD-A463310; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463310>

The transition of effect based operations (EBO), dynamic planning and predictive battlespace awareness (PBA) to the operational environment is resulting in a major shift in the mission planning paradigm. The changes facing mission planners are coupled with a changing adversarial environment. As a result, the mission planning domain is required to support both traditional doctrine based opponents as well as emerging asymmetric adversaries. Mission planners currently utilize whiteboards and documented results in spreadsheets and presentations to support decision making with limited automated tool support. New analysis capabilities must be developed for mission planners to leverage emerging mission planning concepts. This paper will explore EBO scenario generation techniques that can aid the mission planning domain by streamlining the mission planning cycle. Key concepts to be addressed include: (1) utilizing EBO scenario management and generation to direct multiple simulation runs; (2) leveraging simulations to support PBA; (3) maximizing utilization of existing and future tools to support the decision process and (4) providing analysts with actionable information. This paper will highlight a proof of concept demonstration, along with an operational use study.

DTIC

Computerized Simulation; Military Operations; Mission Planning; Planning

20070012974 Army Research Lab., Aberdeen Proving Ground, MD USA

FPGAs and HPC

Pressel, Daniel M; Jan 2007; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463322; ARL-SR-147; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463322>

This report addresses the current uses of field programmable gate arrays (FPGAs) and their potential for use in high performance computing (HPC). FPGAs are devices programmed using languages and methodologies originally developed for describing the circuit layouts used in today's integrated circuits. As such, they are well suited for applications involving bit manipulations performed on a continuous stream of data. However, their general applicability to HPC applications is open to debate. This report details many of the issues that determine the applicability of FPGAs to different classes of problems.

DTIC

Computer Programming; Programming Languages

20070012988 Evidence Based Research, Inc., Suffolk, VA USA

Fidelity versus Cost and Its Effect on Modeling and Simulation

Duncan, Jeff; Jun 2006; 6 pp.; In English

Report No.(s): AD-A463379; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463379>

In both the private sector and government organizations, pressure is continuously applied to the work force to produce 'better, faster, and cheaper.' 'Cheaper' (i.e., the reduction of expenditures) and its effect on the end product and its users is the focus of this paper. The modeling and simulation world is not immune to rising costs and reduced budgets. Included in the applications of models and simulations are training, analysis, experimentation, and acquisition. Each of these applications can be adversely affected by poor fidelity. In some cases cost may be the culprit or may contribute to the problem. The questions one must answer are as follows: (1) Is the resultant simulation good enough to meet the customer's needs?; (2) Is the customer satisfied with the simulation?; and (3) Will the end user trust the simulation? Another area of concern is safety. The fidelity of an aircraft simulator comes to mind. If the fidelity is poor, will the pilot, air crew, and their families suffer due to poor training? Organizations may be forced to reduce fidelity to save money or meet a budget. In some cases, the trade-off is insignificant, while in other cases the result cannot be conveyed in currency. This paper explores the sacrifices that can occur in simulation fidelity due to cost restrictions, and their potential impact upon the end user.

DTIC

Computerized Simulation; Cost Reduction; Costs; Simulation; Simulators

20070012989 Mitre Corp., Bedford, MA USA

Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences

Flournoy, R D; Jain, Prem; Lee, Elizabeth; Mikula, Robert; Seidel, David; Jun 2006; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463380; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463380>

Programs, such as Net-Enabled Command Capability (NECC), implementing net-centric operational concepts, require distributed and concurrent software development and integration/testing capabilities. Their new systems, often integrated with legacy software, have to interact with distributed external environments and users, and must execute in real time. In the commercial sector, eBay and Amazon are pioneering sandbox methods to test and debug real time performance and security-related problems. These methods need to be extended to meet DoD's unique multi-level security needs and real-time requirements. Fortunately, a decade of DoD distributed simulation experience can potentially be applied to find an acceptable approach. Distributed and concurrent software development, testing and legacy software migration problems were overcome with a growth of techniques, processes and experiences. At the highest level, the lessons learned by the simulation community include: (1) continuously improve the systems engineering process, (2) evolve middleware standards, and (3) support the process with specialized distributed test and integration tools. This paper provides a historical perspective for the development of the distributed simulation capability, related middleware evolution and the Federated Development and Engineering Process (FEDEP). FEDEP outlines the systems engineering steps to plan, develop, integrate and test a distributed simulation.

DTIC

Communication Networks; Distributed Interactive Simulation; Simulation

20070013142 Naval Postgraduate School, Monterey, CA USA

Short Message Service (SMS) Security Solution for Mobile Devices

Yu, Loon-Ng; Dec 2006; 113 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462720; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis focuses on the security of Short Message Service (SMS) and the Global System for Mobile communication (GSM) network, and the use of encryption to protect SMS messages. A detailed study of the GSM network, the SMS protocol and various encryption schemes was conducted to understand the properties of different encryption schemes and their applicability to SMS messages. An experiment was conducted to measure the actual performance of various encryption schemes on a modern smart phone. An analysis of the encryption scheme properties and the performance measurement was then conducted to select a suitable scheme for SMS encryption. The selected scheme was implemented in the form of a Secure SMS Chat application to validate the viability of the selected encryption scheme. Potential applications of secure SMS in military settings are also discussed.

DTIC

Messages; Security; Synchronous Meteorological Satellite

20070013149 L-3 Communications Corp., Mesa, AZ USA

AOC Embedded Performance Measurement and Assessment

Stock, William; Schreiber, Brian T; Denning, Todd; Cain, Don; Jun 2006; 30 pp.; In English

Contract(s)/Grant(s): F41627-97-D-5000-0033; Proj-1123; Proj-924

Report No.(s): AD-A462914; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This report contains a review of relevant team assessment literature for potential methods/tools/measures not already known to researchers at the Air Force Research Laboratory, Human Effectiveness Directorate, Warfighter Readiness Research Division (AFRL/HEA); an in-depth feasibility analysis of embedded measurement for the Attack Coordinator position in the Aerospace Operations Center (AOC); and an overview of a modeling approach (e.g., MicroSaint) to measuring performance of the AOC. Each of these efforts is discussed in turn.

DTIC

Aerospace Systems; Computer Assisted Instruction; Embedding; Information Systems; Software Development Tools

20070013168 Baker (Wilfred) Engineering, Inc., San Antonio, TX USA

Cooperative Autonomous Mobile Robots

Leonard, John J; Jul 2005; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66604-05-1-2983

Report No.(s): AD-A463215; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The primary objective of the work was to develop new capabilities for cooperative autonomous operation of multi-agent autonomous mobile robot systems. Many vital Navy missions require autonomous navigation and decision making in complex, unstructured, and dynamic environments. In this work, we set out to develop software for cooperative autonomy and to test these algorithms on new, low-cost autonomous surface craft (ASC). The ASC were operated in several major ONR experiments, including AUVFest in June 2005 and the FAFOS experiment in July, 2005. Lessons learned from cooperative operation of these platforms can pay dividends for a wide variety of Navy research programs.

DTIC

Algorithms; Autonomous Navigation; Autonomy; Computer Programs; Robots

20070013175 Naval Postgraduate School, Monterey, CA USA

New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models

Auguston, Mikhail; Michael, James B; Shing, Man-Tak; Jun 2006; 41 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463224; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This paper presents some concepts, principles, and techniques for automated testing of real-time reactive software systems based on attributed event grammar (AEG) modeling of the environment in which a system will operate. AEG provides a uniform approach for automatic test generation, execution, and analysis. Quantitative and qualitative assessment of the system comprised of the software under test and its interaction with the environment, can be performed based on statistics gathered during automatic test execution within an environment model.

DTIC

Command and Control; Computer Programs; Environment Models; Evaluation; Program Verification (Computers); Quality Control; System Effectiveness

20070013284 Army Research Lab., Aberdeen Proving Ground, MD USA

Workload and Stress of Crews Operating Future Manned Vehicles

Sterling, Bruce S; Perala, Chuck H; Blaske, Stephen F; Feb 2007; 31 pp.; In English; Original contains color illustrations
Report No.(s): AD-A463512; ARL-TR-4023; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This study examined workload and stress of crews operating future manned vehicles during virtual and live simulation and varied threat conditions. The effects, for live simulation only, of autonomous driving, crew position, and driving speed on workload and stress were also examined. Because of the small number of participants, only descriptive statistics were used. Results suggest that for the task of operating a vehicle and searching for and discriminating between dismounted noncombatants and enemy forces, live simulation was more stressful. The two levels of threat for enemy forces did not seem to substantially affect workload or stress, perhaps because the task loads under the two threat levels were not sufficiently different. Autonomous driving did not reduce workload or stress, particularly for the driver. Higher stress levels in the autonomous driving condition suggests that the implementation of autonomous driving in the CAT (Crew Integration and Automation Test Bed) vehicle was not appropriate for a scouting mission that required a precise level of speed control. There was also evidence of the gunner off loading work to the driver during autonomous driving. The gunner had higher workload (and to a lesser extent stress) than did the driver, especially in the higher threat condition where the gunner's responsibilities were greater. Higher speed driving also resulted in higher stress and workload.

DTIC

Navigation; Stress (Physiology); Stress (Psychology); Workloads (Psychophysiology)

20070013285 Army Research Lab., Aberdeen Proving Ground, MD USA

Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation

Perala, Chuck H; Sterling, Bruce S; Scheiner, Steve; Butler, Deborah; Feb 2007; 50 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463513; ARL-TR-4026; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This research examined the impact of crew-aiding behaviors (CABs) on Soldier workload, stress, situation awareness, and performance in a laboratory setting. Specifically, this experiment examined the effectiveness of CABs designed to prioritize targets (based on threat level and proximity) and provide weapons platform and munition recommendations to service each target. This condition was compared with a NoCAB or manual condition in which participants performed the same task of prioritizing and engaging targets without the use of the CABs. Results showed that CABs significantly reduced time and workload when participants conducted the task of prioritizing and engaging targets. Participants took significantly less time to complete the prioritization and engagement task when using CABs versus when they performed the same task manually (i.e., the NoCAB condition). Overall task time was reduced by 36% when CABs were used. Overall workload, as well as the subscales of mental, temporal, and effort workload, were significantly reduced when CABs were used. Overall workload was 28% less when CABs were used versus when they were not. Mental and temporal workload were both 46% less when CABs were used versus when they were not, and effort workload was 36% less when were used versus when they were not.

DTIC

Combat; Simulation; Target Recognition; Targets

20070013290 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance

Foreman, James D; Mar 2007; 133 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463520; AFIT/GIR/ENC/07M-01; No Copyright; Avail.: CASI: [A07](#), Hardcopy

Determining accurate cost and schedule is a crucial step to planning acquisition expenditures but history has shown that estimates are routinely low. Several researchers have attempted to forecast cost and schedule growth; we pick up this stream of research with a new approach. Our data collection and analysis focused on bringing in new data sources and added longitudinal variables to account for changes that took place over time. We assessed cost and schedule parameters for 37 major acquisition programs between Milestones II and III, resulting in 172 input variables and 5 regression models, 2 for schedule slippage and 3 for cost growth. All five models passed statistical scrutiny and exhibited an Adjusted r² in excess of 0.80. The primary discriminator was the inclusion of strictly qualitative variables, taken from Selected Acquisition Report narratives and change justifications. We called these "soft" variables and coded them on a scale of 1 to 5 in the categories of funding problems, political problems, technical challenges, and contractor cost growth. Models with and without soft variables are

presented to demonstrate their relative benefit. Finally, implications and implementation examples provide users a path to what-if analysis and decision-making.

DTIC

Costs; Data Acquisition; Predictions; Regression Analysis; Schedules; Scheduling

20070013309 APT Research, Inc., Huntsville, AL USA

User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software

Harwick, Meredith J; Donath, Nina; Tatom, John W; Feb 2, 2007; 117 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): GS-23F-0153L; Proj-W912DY-05-F0047

Report No.(s): AD-A463570; DDESB-TP-19; No Copyright; Avail.: CASI: [A06](#), Hardcopy

The Safety Assessment for Explosives Risk (SAFER) model was developed to provide a more comprehensive assessment of the overall risk associated with explosives operations and storage. This evaluation involves determining the required Quantity-Distance separation distance based on the relationship between the Potential Explosion Site (PES)/Exposed Site (ES) pair, type of operations (or storage) being conducted in each facility, and the type and quantity of explosives involved. Acceptability is based on comparison of the actual separation distance to the required separation distance. The evaluation is performed independently of all other PESs and ESs involved in the overall siting scenario. Risk-based analysis is exciting in that it allows users to quantify risk and validate their common-sense knowledge that some siting scenarios present more risk than others. Performing risk-based siting can be a complex process. Adding a single PES or ES to an area with multiple PESs and ESs can cause a ripple effect on the overall risk profile. The SAFER model calculates risk in terms of the statistical expectation for loss of life from an explosives event. Three components are multiplied to estimate annual maximum probability of fatality, $P(f)$, and the expected fatalities, $E(f)$: (1) the probability of an explosives event, $P(e)$, (2) the probability of a fatality given an event, $P(f/e)$, and (3) the average exposure of an individual, $E(p)$. This document is the User's Reference Guide for SAFER Version 3.0

DTIC

Explosives; Risk; Safety

20070013340 Air Force Research Lab., Rome, NY USA

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise

Combs, Vaughn T; Hillman, Robert G; Muccio, Michael T; McKeel, Ryan W; Jun 2005; 36 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463694; No Copyright; Avail.: CASI: [A03](#), Hardcopy

System interoperability continues to be one of the key challenges facing the DoD as new capability is developed and fielded while maintaining operation with existing legacy systems. The concept of a Joint Battlespace Infosphere (JBI) was first created in 1999 by the US Air Force (USAF) Scientific Advisory Board (SAB) to address a clear lack of information engineering and interoperability within and among existing, traditionally stove-piped fielded capability. Throughout the ensuing years, the Air Force Research Laboratory has performed research in information management that has further refined the original JBI concepts and has demonstrated how those concepts may be applied to achieve system interoperability. JBI information services allow for mediated, loosely-coupled access to information among systems and system components using a publish and subscribe paradigm. In addition, a query capability is provided for access to archived information. All data exchanged is treated as managed information. Each object published contains associated metadata that is used to broker for information object instances between producers and consumers. The consumers of information provide predicates or constraints over the metadata which are subsequently used to decide what information is appropriate for dissemination to the requesting clients. More recently, DISA has sought to provide an architectural design and implementation of a collection of underlying services that would be available to edge user client applications and systems. These services allow clients to share information intelligently from anywhere within the network environment using a post, discover and pull methodology. These Net-Centric Enterprise Services (NCES) are being developed as a Service-Oriented Architecture (SOA) that uses the latest industry standards such as XML and Web Services.

DTIC

Data Management; Information Management; Information Systems; Interoperability; Military Technology; Research and Development

20070013352 Defence Science and Technology Organisation, Edinburgh, Australia

An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness
Mason, Keith; Sturm, Jeff; Keogh, Craig; Howard, Catherine; Oct 2006; 47 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463716; DSTO-TR-1924; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An Interactive Project Agreement (IPA) between Electronic Warfare and Radar Division of the Defense Science Technology Organization and Thales Australia (formerly ADI Limited) has an initial aim to evaluate DSTO innovations flowing from its ELINT Exploitation for Situational Awareness (ELEXSA) task within Thales Australia's operational situational awareness tool Llama-Cheetah. This document outlines the human in the loop experiment undertaken to determine whether the visual enhancements provided by ELEXSA computational components increased operator situational awareness, thereby improving their ability to achieve tactical goals. Analysis of three hypotheses showed that ELEXSA Enhanced Llama: (1) increases operator survivability; (2) shortens mission duration; and (3) reduces the time helicopter spends vulnerable to detection, compared to Standard Llama. Analysis of anecdotal reports showed that operators using ELEXSA Enhanced Llama had lower workload and stress levels and more accurate perceptions of their vulnerability to radar detection than operators using Standard Llama.

DTIC

Combat; Exploitation; Simulation; Situational Awareness

20070013544 NASA Johnson Space Center, Houston, TX, USA

NASA's Software Safety Standard

Ramsay, Christopher M.; [2007]; 1 pp.; In English; 1st IAASS Conference, 25-27 Oct. 2005, Nice, France; No Copyright; Avail.: Other Sources; Abstract Only

NASA relies more and more on software to control, monitor, and verify its safety critical systems, facilities and operations. Since the 1960's there has hardly been a spacecraft launched that does not have a computer on board that will provide command and control services. There have been recent incidents where software has played a role in high-profile mission failures and hazardous incidents. For example, the Mars Orbiter, Mars Polar Lander, the DART (Demonstration of Autonomous Rendezvous Technology), and MER (Mars Exploration Rover) Spirit anomalies were all caused or contributed to by software. The Mission Control Centers for the Shuttle, ISS, and unmanned programs are highly dependant on software for data displays, analysis, and mission planning. Despite this growing dependence on software control and monitoring, there has been little to no consistent application of software safety practices and methodology to NASA's projects with safety critical software. Meanwhile, academia and private industry have been stepping forward with procedures and standards for safety critical systems and software, for example Dr. Nancy Leveson's book *Safeware: System Safety and Computers*. The NASA Software Safety Standard, originally published in 1997, was widely ignored due to its complexity and poor organization. It also focused on concepts rather than definite procedural requirements organized around a software project lifecycle. Led by NASA Headquarters Office of Safety and Mission Assurance, the NASA Software Safety Standard has recently undergone a significant update. This new standard provides the procedures and guidelines for evaluating a project for safety criticality and then lays out the minimum project lifecycle requirements to assure the software is created, operated, and maintained in the safest possible manner. This update of the standard clearly delineates the minimum set of software safety requirements for a project without detailing the implementation for those requirements. This allows the projects leeway to meet these requirements in many forms that best suit a particular project's needs and safety risk. In other words, it tells the project what to do, not how to do it. This update also incorporated advances in the state of the practice of software safety from academia and private industry. It addresses some of the more common issues now facing software developers in the NASA environment such as the use of Commercial-Off-the-Shelf Software (COTS), Modified OTS (MOTS), Government OTS (GOTS), and reused software. A team from across NASA developed the update and it has had both NASA-wide internal reviews by software engineering, quality, safety, and project management. It has also had expert external review. This presentation and paper will discuss the new NASA Software Safety Standard, its organization, and key features. It will start with a brief discussion of some NASA mission failures and incidents that had software as one of their root causes. It will then give a brief overview of the NASA Software Safety Process. This will include an overview of the key personnel responsibilities and functions that must be performed for safety-critical software.

Author

Software Engineering; NASA Programs; Computer Systems Programs; Standards; Safety

20070013571 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada
Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway

McTaggart, Kevin; Dec 2005; 74 pp.; In English

Report No.(s): AD-A463097; DRDC-ATLANTIC-TM-2005-071; No Copyright; Avail.: CASI: [A04](#), Hardcopy
ONLINE: <http://hdl.handle.net/100.2/ADA463097>

ShipMo3D is DRDC Atlantic's object-oriented library for modelling ship motions in waves. Previous ShipMo3D development considered ships travelling with nominally steady speed and heading. This report describes the extension of the ShipMo3D library to model motions of freely maneuvering ships. New ShipMo3D force components arise from hull maneuvering, resistance, propulsion, and rudder-propeller interaction. Comparisons of turning circle predictions with full-scale trials data for the tanker Esso Osaka give encouraging results. Comparisons of predictions with motions of a steered warship model in waves give very good results. Excellent agreement between predictions for a freely maneuvering ship and for a ship with nominally steady speed and heading indicates that the extension of ShipMo3D to freely maneuvering ships has been correctly implemented. It is recommended that future work further investigate prediction of hull maneuvering forces.

DTIC

Computerized Simulation; Hydrodynamics; Maneuvers; Ships; Simulation

20070013601 Biometrics Task Force, Arlington, VA USA

Biometric Collection, Transmission and Storage Standards. Version 1.1

Jul 24, 2006; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463593; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This document provides a comprehensive technical reference that lists published biometric standards and describes their applicability to the biometric functions described in the Capstone Concept of Operations (CONOPS) for Department of Defense (DoD) Biometrics in Support of Identity Superiority. It was prepared by the DoD Biometrics Standards Working Group (BSWG) to assist in the development of future system-specific policy and technical documents, such as standard operating procedures, architecture technical views, and application profiles. This document provides support for a number of biometric modalities, including: fingerprints, face images, iris images, signature/sign data, hand geometry, and palm prints. It also describes the status of biometric standards in the DoD Information Technology Standards Registry. The appendices of this document contain a brief overview of the criteria for DoD adoption of standards and information on the collection of non-standardized biometric data, including DNA and voice recording samples. The DoD BSWG will update this document on a regular basis as new biometric standards emerge and to maintain consistency with the CONOPS.

DTIC

Biometrics; Data Management; Data Transmission; Security

20070013672 Johns Hopkins Univ., Laurel, MD USA

Support for Dynamic Collaborative Action Teams

Cost, R S; Dale, Markus E; Glock, David P; Mayfield, James; Salamacha, Christine O; Silberberg, David P; Jun 2006; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463259; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An essential step in fielding a timely and effective response to events of global importance is the ability to rapidly identify and integrate a crisis action team. This group should consist of exactly those individuals best qualified to manage the situation. Often, the organization of such a team follows identifiable patterns. Thus, it is important to rapidly identify the type of team, or pattern, required, and to identify the individuals that meet the requirements specified by this pattern. This is a challenging task, as information about people is often distributed across multiple locations, inconsistent or out-of-date, and phrased in the language of different domains. We present a framework that facilitates the rapid integration of teams by identifying scenario-based patterns, and using agent-based search across enterprise boundaries to identify people and assist in their assignment.

DTIC

Systems Integration; Teams

20070013699 NASA Johnson Space Center, Houston, TX, USA

A Coordinated Initialization Process for the Distributed Space Exploration Simulation

Crues, Edwin Z.; Phillips, Robert G.; Dexter, Dan; Hasan, David; March 28, 2007; 16 pp.; In English; 2007 Spring SIW, 25-30 Mar. 2007, Norfolk, VA, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A viewgraph presentation on the federate initialization process for the Distributed Space Exploration Simulation (DSES) is described. The topics include: 1) Background: DSES; 2) Simulation requirements; 3) Nine Step Initialization; 4) Step 1: Create the Federation; 5) Step 2: Publish and Subscribe; 6) Step 3: Create Object Instances; 7) Step 4: Confirm All Federates Have Joined; 8) Step 5: Achieve initialize Synchronization Point; 9) Step 6: Update Object Instances With Initial Data; 10) Step 7: Wait for Object Reflections; 11) Step 8: Set Up Time Management; 12) Step 9: Achieve startup Synchronization Point; and 13) Conclusions

CASI

Computerized Simulation; Space Exploration; Distributed Processing; Architecture (Computers)

20070013725 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V.

Kuznetsova, M.; Hesse, M.; Rastaetter, L.; Maddox, M.; Macneice, P.; Chulaki, A.; Berrios, D.; [2007]; 1 pp.; In English; 2006 Air Force Weather (AFW) Technology Transition Summit, 6-8 Sept. 2006, Omaha, NE, USA; No Copyright; Avail.: Other Sources; Abstract Only

In support of Operations Community Coordinated Modeling Center (CCMC) performing validation and verification of space weather models. To identify suitable metrics the CCMC focus on parameters most useful to operations that CCMC resident models can provide. The real time simulations carried out at CCMC are an essential tool to test model performance and stability by using input conditions that may occur in nature at any time. Since 2001, the magnetospheric MHD model BATSRUS has been run in real time using ACE real time data. CCMC staff developed an experimental real-time system that controls uploading of the real-time ACE data, monitors continuous model execution, initiates automatic recovery procedure in case of data gaps or hardware failures, synchronizes BATSRUS and FRC runs, and periodically runs IDL based visualization software.

Author

Computerized Simulation; Proving; Real Time Operation; Program Verification (Computers); Software Reliability

20070013739 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC)

Quattrochi, Dale A.; Irwin, Daniel; Presson, Joan; Estes, Maury; Estes, Sue; Judd, Kathleen; [2006]; 1 pp.; In English; SERVIR Summit, 3-6 Dec. 2006, Syracuse, NY, USA; Copyright; Avail.: Other Sources; Abstract Only

The Gulf of Mexico Regional Collaborative (GoMRC) is a NASA-funded project that has as its goal to develop an integrated, working, prototype IT infrastructure for Earth science data, knowledge and models for the five Gulf U.S. states and Mexico, and to demonstrate its ability to help decision-makers better understand critical Gulf-scale issues. Within this preview, the mission of this project is to provide cross cutting solution network and rapid prototyping capability for the Gulf of Mexico region, in order to demonstrate substantial, collaborative, multi-agency research and transitional capabilities using unique NASA data sets and models to address regional problems. SERVIR Mesoamerica is seen as an excellent existing framework that can be used to integrate observational and GIS data bases, provide a sensor web interface, visualization and interactive analysis tools, archival functions, data dissemination and product generation within a Rapid Prototyping concept to assist decision-makers in better understanding Gulf-scale environmental issues.

Author

Gulf of Mexico; Earth Sciences; Regions; Atmospheric Models

62

COMPUTER SYSTEMS

Includes computer networks and distributed processing systems. For information systems see *82 Documentation and Information Science*. For computer systems applied to specific applications, see the associated category.

20070011404 Defence Research and Development Canada, Ottawa, Ontario Canada

Network Event Correlation Using Unsupervised Machine Learning Algorithms

Dondo, Maxwell; Mason, Peter; Japkowicz, Nathalie; Smith, Reuben; Nov 2006; 107 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462898; DRDC-ONTARIO-TM-2006-193; No Copyright; Avail.: CASI: [A06](#), Hardcopy

We have successfully implemented a two-stage event correlation model for intrusion detection system (IDS) alerts. The model is designed to automate alert and incidents management and reduce the workload on an IDS analyst. We achieve this

correlation by clustering similar alerts together, thus allowing the analyst to only look at a few clusters instead of hundreds or thousands of alerts. The first stage of this model uses an artificial neural network (ANN)-based autoassociator. The autoassociator is trained to reproduce each alert at its output, and it uses the error metric between its input and output to cluster similar alerts together. The accuracy of the system is improved by adding another machine-learning stage which attempts to combine closely related clusters produced by the first stage into super-clusters. The second stage uses the Expectation Maximisation (EM) clustering algorithm. The model and performance of this model are tested with intrusion alerts generated by a Snort IDS on DARPA's 1999 IDS evaluation data as well as incidents.org alerts.

DTIC

Algorithms; Machine Learning

20070011406 Cinnabar Networks, Inc., Ottawa, Ontario Canada

MulVAL Extensions for Dynamic Asset Protection

Bacic, Eugen; Froh, Michael; Henderson, Glen; Apr 2006; 68 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W7714-5-3247

Report No.(s): AD-A462897; DRDC-ONTARIO-CR-2006-251; No Copyright; Avail.: CASI: [A04](#), Hardcopy

This paper documents research into extensions to the Multihost, Multistage Vulnerability Analysis (MulVAL) framework to support DRDC efforts to develop a feasible abstraction in the area of defensive posture technology. The results presented in this paper demonstrate that the MulVAL model is extensible and can be enhanced to include additional data representation and analysis features to tailor the model to meet the need of the DND defence community. The extensions evaluated in this effort have been shown to be both technically valid given the capabilities of logic-based programming and appropriate given the current model data representations. The primary extensions researched as part of this work are: improved representation of network path constructs and assignment of value to data assets in the model. This paper documents a substantial degree of progress in the development of each of the proposed MulVAL extensions.

DTIC

Computer Networks; Protection

20070011411 Defence Research and Development Canada, Ottawa, Ontario Canada

Dynamic Defensive Posture for Computer Network Defence

Burrell, Craig; Lefebvre, Julie; Treumiet, Joanne; Dec 2006; 41 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462872; DRDC-ONTARIO-TM-2006-250; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This paper examines the concept of dynamic defensive posture in computer networks. We propose that defensive posture is provided by knowledge of whether and how critical network resources are vulnerable to attack. After introducing the basic concept, we discuss the constituent elements of defensive posture. We then review relevant technologies, finding that current technology addresses only aspects of the problem. Finally, we propose a variety of research problems for which the solutions would contribute significantly to our ability to identify a network's defensive posture.

DTIC

Computer Networks; Posture

20070011431 Space and Naval Warfare Systems Command, Charleston, SC USA

Agile Assessment Techniques for Evaluating Mission Capability Portfolio Ensembles in Complex Adaptive Architectures

Lenahan, Jack; Jan 2005; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462320; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462320>

Given the prototypical architectural template's demise, the purpose of this research is to begin a formulation of the Agile Assessment Methodology needed to evaluate the mission capability impact of using composable web services in complex adaptive architectures. Network Centric Warfare (NCW) Assessment Processes must validate that a 'rush towards a transformation' by date 'X' does not sacrifice warfighter capability by introducing de-stabilizing architecture components. What assessment methodology and criteria will be used to evaluate or even define the NCW architectural boundaries for platform system reductions? What assessment methodology will be used to evaluate mission execution success probabilities given the migration away from traditional platform centric mission capabilities? The results of this research indicate that platforms should be wary of removing systems in favor of GIG services which may jeopardize crew or platform survivability;

it also recommends that composable assessment and simulation capabilities required to manage the assessment of mixed architecture capability ensembles be developed.

DTIC

Command and Control; Architecture (Computers); Network Analysis

20070011445 Ottawa Univ., Ontario Canada

Review of Existing Wormhole Attack Discovery Techniques

Gorlatova, Maria A; Aug 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W7714-050929

Report No.(s): AD-A462894; DRDC-ONTARIO-CR-2006-165; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In this report, we describe a severe Mobile Ad Hoc Network (MANET) routing attack called a wormhole attack and review state-of-the-art ways to thwart wormhole attacks. In a wormhole attack, intruders tunnel the data from one end of the network to the other, leading distant network nodes to believe they are neighbours and making them communicate through the wormhole link. Unlike many other attacks on ad hoc routing, a wormhole attack can not be prevented with cryptographic solutions because intruders neither generate new, nor modify existing, packets, but rather forward existing ones.

DTIC

Computer Viruses; Cryptography

20070011451 Naval Research Lab., Washington, DC USA

How Far Can You Trust A Computer?

Landwehr, Carl E; Jan 1993; 10 pp.; In English

Report No.(s): AD-A462827; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The history of attempts to secure computer systems against threats to confidentiality, integrity, and availability of data is briefly surveyed, and the danger of repeating a portion of that history is noted. Areas needing research attention are highlighted, and a new approach to developing certified systems is described.

DTIC

Computer Information Security; Hazards; Computers

20070011474 Minnesota Univ., Minneapolis, MN USA

On Access Checking in Capability-Based Systems

Kain, Richard Y; Landwehr, Carl E; Feb 1987; 11 pp.; In English

Contract(s)/Grant(s): MDA904-84-C-6011

Report No.(s): AD-A462757; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Public descriptions of capability-based system designs often do not clarify the necessary details concerning the propagation of access rights within the systems. A casual reader may assume that it is adequate for capabilities to be passed in accordance with the rules for data copying. A system using such a rule cannot enforce either the military security policy or the Bell and LaPadula rules. The paper shows why this problem arises and provides a taxonomy of capability-based designs. Within the space of design options defined by the taxonomy we identify a class of designs that cannot enforce the Bell-LaPadula rules and two designs that do allow their enforcement.

DTIC

Computer Information Security; Systems Engineering

20070011596 Virginia Univ., Charlottesville, VA USA

Wide-Area Computing: Resource Sharing on a Large Scale

Grimshaw, Andrew; Ferrari, Adam; Knabe, Frederick; Humphrey, Marty; May 1999; ISSN 0018-9162; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-96-C-8527; LD-9391; F459000-16-3C; DE-FD02-96ER-25290

Report No.(s): AD-A455550; Copyright; Avail.: Other Sources

Computing over wide-area networks has been largely ad hoc, but as needs increase, piecemeal solutions no longer make sense. Legion, a network-level operating system, was designed from scratch to target wide-area computing demands.

DTIC

Wide Area Networks; Operating Systems (Computers)

20070011636 NASA Langley Research Center, Hampton, VA, USA, National Inst. of Aerospace, Hampton, VA, USA
A Parallel Saturation Algorithm on Shared Memory Architectures

Ezekiel, Jonathan; FROM; Siminiceanu; February 2007; 21 pp.; In English

Contract(s)/Grant(s): NCC1-02043; WBS 411931.02.07.07

Report No.(s): NASA/CR-2007-214543; NIA Report No. 2007-01; Copyright; Avail.: CASI: [A03](#), Hardcopy

Symbolic state-space generators are notoriously hard to parallelize. However, the Saturation algorithm implemented in the SMART verification tool differs from other sequential symbolic state-space generators in that it exploits the locality of ring events in asynchronous system models. This paper explores whether event locality can be utilized to efficiently parallelize Saturation on shared-memory architectures. Conceptually, we propose to parallelize the ring of events within a decision diagram node, which is technically realized via a thread pool. We discuss the challenges involved in our parallel design and conduct experimental studies on its prototypical implementation. On a dual-processor dual core PC, our studies show speed-ups for several example models, e.g., of up to 50% for a Kanban model, when compared to running our algorithm only on a single core.

Author

Algorithms; Architecture (Computers); Memory (Computers); Parallel Processing (Computers); Mathematical Models

20070011684 GIS/Trans, Ltd, Austin, TX, USA

Update of the Non-State Trunk Inventory

Collier, C.; Saxena, S.; Kuykendall, W. K.; Oct. 23, 2000; 78 pp.; In English

Contract(s)/Grant(s): SD-310710

Report No.(s): PB2007-106400; No Copyright; Avail.: CASI: [A05](#), Hardcopy

GIS/Trans Ltd. provided consultant services to integrate the existing NSTRI database with updated information from a recently completed GPS inventory. The first step was to review the current environment of the NSTRI and the data items contained in it, as well as the data items contained in the GPS inventory. Recommendations were made regarding the suitability of retaining certain data items and all data items were ranked in order of importance. Since there was no common key field in the databases, they could not be joined using standard database techniques. It was determined that using a Geographic Information System (GIS) to join the databases based on the location of the attribute sections was the most appropriate method to use. The GPS Inventory collected the road centerlines (basemap) with accurate road lengths (measures), and certain road characteristics as attributes. The GPS attributes could be placed directly on the basemap since their measures matched those of the basemap. The NSTRI method of locating attribute sections however, had to be converted into the same measurement system as the GPS. A Linear Referencing System (LRS) was created for the NSTRI which allowed the researchers to place the NSTRI data on the same basemap as the GPS data. Finally, the two databases could be joined by matching the route identifiers, and the measures for each attribute record. Upon determining that the databases could in-fact be joined, procedures for maintaining and updating the combined database were recommended. Resources required to maintain the database were also recommended.

NTIS

Data Bases; Global Positioning System; Roads

20070011764 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Toward a Framework for Modeling Space Systems Architectures

Shames, Peter; Skipper, Joseph; FROM; June 19, 2006; 13 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39851>

In this paper we will describe this extended RASDS/RAMSS methodology, the set of viewpoints that we have derived, and describe their relationship to RM-ODP. While this methodology may be directly used in a variety of document driven ways to describe space system architecture, the real power of it will come when there are tools available that will support full description of system architectures that can be captured electronically in a way that permits their analysis, verification, and transformation.

Author

Space Missions; Architecture (Computers); Aerospace Systems

20070012329 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

CAISSON: Interconnect Network Simulator

Springer, Paul L.; June 10, 2006; 17 pp.; In English; SGI User Group, 5-9 Jun. 2006, Las Vegas, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): NAS7-03001; NM0715612; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39799>

Cray response to HPCS initiative. Model future petaflop computer interconnect. Parallel discrete event simulation techniques for large scale network simulation. Built on WarpIV engine. Run on laptop and Altix 3000. Can be sized up to 1000 simulated nodes per host node. Good parallel scaling characteristics. Flexible: multiple injectors, arbitration strategies, queue iterators, network topologies.

Derived from text

Simulators; Cray Computers; Injectors

20070012359 NASA Langley Research Center, Hampton, VA, USA

A Robust Scalable Transportation System Concept

Hahn, Andrew; DeLaurentis, Daniel; March 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NNL05AA16G; WBS 23-062-10-03; Copyright; Avail.: CASI: [A03](#), Hardcopy

This report documents the 2005 Revolutionary System Concept for Aeronautics (RSCA) study entitled 'A Robust, Scalable Transportation System Concept'. The objective of the study was to generate, at a high-level of abstraction, characteristics of a new concept for the National Airspace System, or the new NAS, under which transportation goals such as increased throughput, delay reduction, and improved robustness could be realized. Since such an objective can be overwhelmingly complex if pursued at the lowest levels of detail, instead a System-of-Systems (SoS) approach was adopted to model alternative air transportation architectures at a high level. The SoS approach allows the consideration of not only the technical aspects of the NAS', but also incorporates policy, socio-economic, and alternative transportation system considerations into one architecture. While the representations of the individual systems are basic, the higher level approach allows for ways to optimize the SoS at the network level, determining the best topology (i.e. configuration of nodes and links). The final product (concept) is a set of rules of behavior and network structure that not only satisfies national transportation goals, but represents the high impact rules that accomplish those goals by getting the agents to 'do the right thing' naturally. The novel combination of Agent Based Modeling and Network Theory provides the core analysis methodology in the System-of-Systems approach. Our method of approach is non-deterministic which means, fundamentally, it asks and answers different questions than deterministic models. The nondeterministic method is necessary primarily due to our marriage of human systems with technological ones in a partially unknown set of future worlds. Our goal is to understand and simulate how the SoS, human and technological components combined, evolve.

Derived from text

National Airspace System; Robustness (Mathematics); Air Transportation; Systems Integration; Communication Networks

20070012753 Brookhaven National Lab., Upton, NY, USA

Acceleration Physics Code Web Repository

Wei, J.; Jun. 2006; 5 pp.; In English

Report No.(s): DE2006-894615; BNL-77112-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

In the framework of the CARE HHH European Network, we have developed a web-based dynamic accelerator-physics code repository. We describe the design, structure and contents of this repository, illustrate its usage, and discuss our future plans, with emphasis on code benchmarking.

NTIS

Acceleration (Physics); Computer Systems Design

20070012801 Naval Postgraduate School, Monterey, CA USA

Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN)

Loh, Kuan C; Dec 2006; 91 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462654; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462654>

This thesis analyzes the ITU-T G.7712 standard to evaluate the main features and specifications that are defined in the 11/2001 edition. The latest 03/2003 revision was also reviewed to determine what are the changes and latest update presented

in that paper. In order to find out the compliance among telecommunication industry vendors, surveys were also conducted to determine which is the most widely supported standard. Finally, simulations were run using Opnet IT Guru software for the two routing protocols defined in the standard, IS-IS and OSPF, to examine their characteristics and determine their usefulness. It was observed that OSPF achieves better performance and is the least obtrusive on network operations.

DTIC

Communication Networks; Data Transmission; Reliability Analysis; Simulation

20070012827 Defence Science and Technology Organisation, Edinburgh, Australia

A Network Centric Warfare (NCW) Compliance Process for Australian Defence

Knight, Michele; Vencel, Les; Moon, Terry; Aug 2006; 85 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462949; DSTO-TR-1928; AR-013-770; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462949>

The NCW Program Office (NCWPO) is responsible for ensuring that the ADF's capability projects are Network Centric Warfare (NCW) compliant, from the time they are listed in the Defence Capability Plan until they enter service as realised capabilities and throughout life-of-type. The NCWPO has engaged a number of different groups to look at the problem of NCW Compliance from different perspectives. This report describes one of these studies. It proposes an NCW Compliance Process that is based on a simple underlying conceptual model. It also identifies some critical issues to be addressed by the NCWPO in order to improve the rigour and quality of the NCW Compliance Process.

DTIC

Australia; Command and Control; Warfare

20070012867 Naval Research Lab., Washington, DC USA

Formal Requirements for Key Distribution Protocols

Syverson, Paul; Meadows, Catherine; Jan 1994; 13 pp.; In English

Report No.(s): AD-A463018; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463018>

We discuss generic formal requirements for reasoning about two party key distribution protocols, using a language developed for specifying security requirements for security protocols. Typically earlier work has considered formal analysis of already developed protocols. Our goal is to present sets of formal requirements for various contexts which can be applied at the design stage as well as to existing protocols. We use a protocol analysis tool we have developed to determine whether or not a specific protocol has met some of the requirements we specified. We show how this process uncovered a flaw in the protocol and helped us refine our requirements.

DTIC

Cryptography; Protocol (Computers); Security

20070012905 Evidence Based Research, Inc., Vienna, VA USA

Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM

Garstka, John; Holloman, Kimberly; Balisle, Christine W; Adkins, Mark; Kruse, Jon; Jan 2006; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W74V8H-04-D-0051

Report No.(s): AD-A463082; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463082>

The purpose of this case study report is to describe the evolution of network enabled capabilities in the context of naval operations conducted under the command of RADM (now retired) T. Zelibor. The focus is on the background and creation of Task Force 50 (TF-50), and primarily on the evolution of the transformational capabilities that permitted TF-50 to succeed in the manner that it did. The study examines those transformation innovations from their inception up through current day. The evidence is drawn from discussions with key naval and TF-50 personnel, as well as open-source data. This case begins with an overview of the overall case study and introduction. It is followed by a brief review of TF-50. The report then describes the study methodology. The findings section follows, and describes in detail the development and success of TF-50, including information regarding various technological systems, information sharing practices, and the importance of strong leadership. The final section of this report includes the conclusions. This study finds that it is the continuous evolution of a variety of factors that lead to the effectiveness and efficiency of TF-50. It did not require unlimited financial resources to make this

change happen. Rather this transformation occurred as a result of intuitive leadership, a culture to allow for change, and personnel willing to trust a new method of operating.

DTIC

Communication Networks; Computer Networks; Military Operations

20070012923 Space and Naval Warfare Systems Command, San Diego, CA USA

FORCENet Net Centric Architecture - A Standards View

Stewart, Fred M; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463113; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463113>

As the operational construct and architectural framework for naval warfare, FORCENet is the Navy and Marine Corps initiative to achieve Netcentric Warfare (NCW) and Joint Transformation by providing robust information sharing and collaboration across the naval force. FORCENet is defined as the operational construct and architectural framework for naval warfare in the information age that integrates warriors, sensors, networks, command and control, platforms, and weapons into a networked, distributed combat force that is scalable across all levels of conflict from seabed to space and sea and land. The FORCENet enterprise architecture provides the naval Netcentric framework. Part of the architecture is a list of standards to provide the entire Naval community with a source of standards to ensure Naval, joint, and allied coalition interoperability in support of the netcentric objective. The information technology standards to implement a Netcentric capability are a key element to build the FORCENet capability. The main focus of this paper will be the technical standards.

DTIC

Command and Control; Navy; Warfare

20070012942 Johns Hopkins Univ., Laurel, MD USA

Enabling Effective Decisions

Buchanan, Tom; Galpin, Tim; Hillman, Jim; Leonhard, Bob; Nolen, John; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463176; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463176>

This briefing describes the operational environment decision makers will be operating within and what command and control systems will be needed. Real world conflict features the interaction of opposing ideas. The key to success is understanding these interactions; when and how to use each; and to transition seamlessly from one to another. Agility will be key.

DTIC

Command and Control; Decision Making

20070012983 Vitech Corp., Vienna, VA USA

Validating DoD Architectures: The Promise of Systems Engineering

Reynolds, Joseph P; Jun 2006; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463369; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463369>

Today's needs for interoperability and portfolio management, across military organizations worldwide, lead to increased focus on architecture development. Architecture frameworks are sponsored by Defense Departments in Australia, Canada, France, Korea, UK and USA. The majority of today's efforts in architecture development focus on generation of disparate architecture views, seemingly without the benefit and rigor offered by systems engineering. This paper describes the DoDAF validator--a Model Based Systems Engineering (MBSE) approach to the architecture development process. The approach is an extension to a proven systems engineering process that creates a win-win scenario for executive oversight team as well as the operational and engineering communities. The process also ensures that interoperability based on executable design verification leads to program success and consistent and accurate architecture perspectives for further analysis.

DTIC

Command and Control; Defense Program; Systems Engineering

20070013143 Carnegie-Mellon Univ., Pittsburgh, PA USA

Coordinating Initiation and Response in Computer-Mediated Communication

Dabbish, Laura A; Dec 2006; 207 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NBCHC030029; IIS-0325351

Report No.(s): AD-A462721; CMU-HCII-06-108; No Copyright; Avail.: CASI: [A10](#), Hardcopy

Communication interruptions make work sociable and interesting, and they support flexibility and knowledge transfer in the workplace. However, interruptions also delay task completion and degrade performance, with negative consequences for organizational effectiveness. When communication is technologically mediated, how can we maintain connectivity while reducing the potential disruption associated with informal interaction? This thesis examines factors influencing the decision to initiate and respond to communication, and the impacts of communication interactions on both sender and receiver. This thesis advances previous work by considering factors that influence both members of a communication pair. Using a set of laboratory studies, the work presented explores the ways in which awareness displays i.e., displays that make visible the task constraints of both senders and receivers affect communication timing. Results indicate that such displays are useful for coordinating communication only when the sender and the receiver have a common social identity and joint incentives. Finally, communication decision-making is examined in the context of the most commonly used form of computer-mediated communication to date: email. The contribution to human-computer interaction is an increased understanding of attention to workplace communication, as well as a set of practical guidelines for the design of electronic communication systems. The results also have relevance in the fields of information systems and organizational communication.

DTIC

Electronic Mail; Interprocessor Communication

20070013157 USA Joint Forces Command, Norfolk, VA USA

The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts)

Blatt, Nicole; Macfarlane, Steele; Myers, Jack; Jun 2006; 26 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463170; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Command and Control Joint Integrating Concept (C2 JIC) is part of the Family of Joint Future Concepts (JOpsC). All of the Joint Future Concepts feed the Joint Capabilities Integration and Development System (JCIDS) which underpins investment decisions leading to the development of new capabilities, both materiel and nonmateriel. U.S. Commanders must be able to exercise effective C2 of an interdependent joint force in rapidly changing scenarios involving complex distributed, simultaneous or sequential operations, often with other agencies and nations. These challenges will require significant enhancement to present C2 capabilities. The C2 JIC promotes the development of command and control (C2) capabilities for agile, decisive and integrated force employment in all phases of combat and supporting operations, as required by the National Military Strategy (NMS) 04. It also provides the basis for rigorous assessment and analysis of capability gaps and excesses through a Capabilities-Based Assessment (CBA) process.

DTIC

Charts; Command and Control; Design Analysis; Words (Language)

20070013163 Naval Postgraduate School, Monterey, CA USA

Network on Target: Remotely Configured Adaptive Tactical Networks

Bordetsky, Alex; Bourakov, Eugene; Jun 2006; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463209; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The emerging tactical networks represent complex network-centric systems, in which multiple sensors, unmanned vehicles, and geographically distributed units of highly mobile decision makers, transfer and analyze data while on the move. The network could easily scale up to hundreds of cooperating nodes, providing tactical extension to the system-of-systems environment of Global Information Grid. The node mobility as well as ad hoc network topology reconfiguration becomes a powerful control option, which network operators or intelligent management agents could apply to provide for self-forming, self-healing behavior. This in turn requires new techniques for adaptive remote management of mobile wireless nodes; their rapid remote or autonomous reconfiguration at both physical and application layers, subject to changing operational requirements.

DTIC

Autonomy; Decision Making; Remote Control; Targets; Topology

20070013172 Science Applications International Corp., McLean, VA USA

Executable Architectures for Modeling Command and Control Processes

Lich, Jason E; Lau, Yun-Tung; Jun 2006; 19 pp.; In English; Original contains color illustrations
Report No.(s): AD-A463220; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper presents a high-level modeling and simulation (M&S) approach that is intended to be used early in the systems engineering lifecycle. The approach leverages behavior modeling techniques for designing executable function flows (i.e. functional simulation). It is built on system architecture products (such as DoD Architecture Framework (DoDAF) products) and is referred to as Executable Architecture (EA). EA is designed to provide a higher-level view or abstraction of certain definable processes. Besides being an effective way of disseminating architecture visions to a wide range of stakeholders, EA provides the following benefits: * Validation of the system architecture based on operational processes * Insight into the military usefulness of the system * Generation of first order, end-to-end performance metrics * Discovery of hidden or overlooked requirements * A way to document, validate, refine and communicate strategic objectives * An early construct for trade analyses in the systems engineering space

DTIC

Command and Control; Support Systems; Systems Engineering

20070013225 Air Force Operational Test and Evaluation Center, Langley AFB, VA USA

A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool

Simpson, Marvin L; Jan 2006; 46 pp.; In English
Report No.(s): AD-A463398; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The current operational Air Tasking Order (ATO) planning tool, Theater Battle Management Core System (TBMCS) application Theater Air Planner (TAP), is approaching obsolescence. This application runs on a Uniplexed Information and Computing System (UNIX) platform. Most computers in the Air and Space Operations Center (AOC) are Windows/Intel-based PCs. The TAP application is the culmination of a long line of outstanding computer applications that minimized the time and manpower needed to create the USA Message Text Format (USMTF) ATO message. We must now posit conceptual requirements for the next generation Operation Airpower Planning tool. The design philosophies to achieve the capabilities required of the Operation Airpower Planning tool and the USMTF ATO production tool are diametrically opposed, despite their essentially identical role in directing assigned tactical forces. The purpose of the ATO and Air Control Order (ACO), as defined by the USMTF, is 'The ATO is used to task air missions and assign cross-force tasking and may also be used for intra-Service tasking,' while 'The ACO is used to provide specific detailed orders for airspace management from a higher command to subordinate units.' To clarify our goal in creating the next generation Operational Airpower Planning Tool, we must understand the history of the USMTF ATO production tool. The ATO message is divided into two sub-sets, Mission Data Lines (MSNDAT) and Special Operation Instructions (SPINS). Traditionally, the AOC staff creates MSNDAT and Air Force Forces (AFFOR) staff creates the information required for SPINS. Both sets of information and the information in the ACO message are required to execute combat air power.

DTIC

Command and Control; Machine Tools; Management Planning; Operational Problems; Planning

20070013236 Naval War Coll., Newport, RI USA

Network Centric Warfare - Death or Renaissance of the Operational Art and the Operational Level of War

Day, Tim L; May 17, 2005; 22 pp.; In English
Report No.(s): AD-A463423; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Network Centric Warfare is clearly the next great revolution in warfare but it is certainly not going to be the death of the operational level of war. NCW will change our military and has already begun to reduce levels of command at the tactical level. But when NCW is implemented fully and the 3 domains of physical, information and cognitive are taken into account in that implementation it is clear that the operational level of war is not disappearing but becoming increasingly important. The operational commander of the future will practice the operational arts in the form that has been touted by Clausewitz and Sun Tzu and technology will once again become a tool rather than an answer.

DTIC

Communication Networks; Death; Warfare

20070013327 Syracuse Univ., NY USA

Architectural Vulnerabilities of Third-Generation Portable Devices

Chin, Shiu-Kai; Jan 2007; 77 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-04-2-0058; Proj-2311

Report No.(s): AD-A463614; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The development of the Handheld Evidence Recovery Operator (HERO) has created a new paradigm for extracting evidence from portable devices without modifying the device. We developed a handheld evidence recovery operator to address the challenges created by user passwords and PINs, and a standalone tool to copy the data located on the device to an external storage medium without modifying the device.

DTIC

Portable Equipment; Vulnerability

20070013338 Naval War Coll., Newport, RI USA

Computer Network Attack and Its Effectiveness against Non-State Actors

Presby, Timothy D; Feb 13, 2006; 23 pp.; In English

Report No.(s): AD-A463692; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Computer Network Attack (CNA) is a subset of Computer Network Operations (CNO), which is a core capability of Information Operations. CNA is defined as operations to disrupt, deny, degrade, or destroy information resident in computers and computer networks or the computers and networks themselves. With the USA engaged in counter-insurgency operations against terrorist groups, synchronizing the effects of CNA with more traditional forms of kinetic attacks, as well as other instruments of national power, permits the USA to achieve its political and military objectives at a reduced cost. The dependency of non-state adversaries on computer systems will only grow as information systems become more pervasive in under-developed nations. CNA, while typically not decisive in itself, can help shape the battlespace and serve as an effective instrument against non-state actors. The effects of CNA can bring synergy, balance, leverage, simultaneity and depth to an operation while helping to achieve the objective in a timely manner with measurable results. Leaders looking to plan and execute CNA operations against non-state opponents need to focus on improved intelligence, better training and awareness, and proper assurance testing and deconfliction to improve the chance of success. Planners also need to be careful to ensure that CNA is conducted within a legal and ethical framework.

DTIC

Computer Networks

20070013545 NASA Johnson Space Center, Houston, TX, USA, United Space Alliance, Houston, TX, USA

Sustainable, Reliable Mission-Systems Architecture

O'Neil, Graham; Orr, James K.; Watson, Steve; [2007]; 8 pp.; In English; Space 2005, 30 Aug. - 1 Sept. 2005, Long Beach, CA, USA

Contract(s)/Grant(s): NAS9-20000; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013545>

A mission-systems architecture, based on a highly modular infrastructure utilizing: open-standards hardware and software interfaces as the enabling technology is essential for affordable and sustainable space exploration programs. This mission-systems architecture requires (a) robust communication between heterogeneous system, (b) high reliability, (c) minimal mission-to-mission reconfiguration, (d) affordable development, system integration, and verification of systems, and (e) minimal sustaining engineering. This paper proposes such an architecture. Lessons learned from the Space Shuttle program and Earthbound complex engineered system are applied to define the model. Technology projections reaching out 5 years are made to refine model details.

Author

Architecture (Computers); Modularity; Computer Systems Programs; Reliability Analysis; Complex Systems

20070013577 Air War Coll., Maxwell AFB, AL USA

Network-Centric Operations: Challenges and Pitfalls

Silbaugh, Eric E; Nov 2005; 31 pp.; In English

Report No.(s): AD-A463336; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Network-centric operations (NCO) concepts and capabilities are central to Department of Defense (DOD) transformation efforts and are predicted by advocates to have wide-ranging impacts on the conduct of warfare and military forces. NCO

concepts cover the entire military response to the Information Age, including ways of thinking, human and organizational behavior, and the networks the military uses across the tactical, operational, and strategic levels of warfare. In a broad sense, NCO is about harnessing networks and networked forces to create military advantages and capabilities. This paper first highlights the centrality of NCO to DoD transformation efforts by using examples from Joint Visions 2010 and 2020, the Office of the Secretary of Defense's Office of Force Transformation (OFT), and Service transformation documents to demonstrate the importance of NCO to DoD. Next, it examines NCO concepts to identify core characteristics and underlying capabilities levied on the supporting network. These sources of NCO thought come primarily from DoD authors; however, many other countries and alliances, including the UK, Canada, Australia, New Zealand, and NATO, are also interested in NCO-like concepts. The paper then analyzes several capabilities required of networks to determine some of the attendant requirements and challenges. This analysis includes potential impacts should networks fail to achieve the required performance or collapse under attack. These challenges are illustrated using examples from the author's experience on the CENTCOM/J6 staff during Operations Enduring Freedom and Iraqi Freedom (OEF and OIF). Finally, the analysis provides some recommendations to mitigate associated vulnerabilities introduced by relying upon networks and the promises of NCO.

DTIC

Communication Networks; Computer Networks; Defense Program; Requirements

20070013644 CACI International, Inc., Arlington, VA USA

National Command Capability (NCC): Design for a Collaboration Architecture

Lyon, Peter H; Dick, David; Jun 2006; 16 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463354; No Copyright; Avail.: CASI: [A03](#), Hardcopy

National crises demand that leadership deliver an effective response that requires: timely alerts and warning, accurate information on emerging situations, the ability to consult with distributed partners, the ability to collaborate with authorities in various jurisdiction, and the ability to show leadership and support to the people. The National Command Capability (NCC) solution is to create a virtual 'collaboration environment' of software and hardware capable of delivering services and applications to anyone with a web browser. The NCC also provides a 'trusted information environment' that allows the leadership to perform all critical functions. This briefing describes an approach to bring urgent progress in these areas within a single unified framework for command capability. This NCC architecture framework can lead progress in SOA architecture as a distributed network standard. By taking advantage of current models of technology and technology partnerships in the private sector, this NCC design can inspire rapid deployment, early adoption and innovative growth in support of cross agency information sharing.

DTIC

Command and Control; Architecture (Computers); Communication Networks

20070013660 Air War Coll., Maxwell AFB, AL USA

Network-Enabled Precision Guided Munitions

Koudelka, Jr, Benjamin F; Nov 2005; 25 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463458; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Network-centric warfare (NCW) is changing the way the U.S. military fights and wins wars. Networked technology and new operational concepts enable networked units and individual platforms to operate in ways not possible a few years ago. The goal is to link weapon systems, sensors, and people into a single network in which the whole is greater than the sum of its parts. To accomplish this goal, DOD is moving toward highly integrated force networks that combine information superiority with advances in technologies for surveillance, communications, and precision weapons. Collectively, the integration of these systems offers the possibility of creating a well-populated global information grid (GIG). The GIG is a system of systems consisting of an accessible knowledge base where users may disseminate or retrieve information real-time. Users may connect to the GIG by accessing nodes on the network to collaborate with other warfighters. These nodes consist of sensors, networks and even PGMs. PGMs are an easily overlooked node and, if properly integrated, can add flexibility, speed, and real-time situational awareness to the battlespace. As munitions link directly to the GIG, they become contributors providing in-flight updates prior to warhead detonation. Most importantly, network-enabled PGMs provide a means to fill a documented capability gap against mobile targets. Much research exists concerning NCW and its potential but very little information is available regarding network-enabled weapons. The purpose of this research paper is to discuss how the next generation of air-to-ground weapons may impact network-centric operations. To begin, the paper will briefly discuss how NCW improves battlespace awareness and then examine current PGM capabilities and limitations to use as a framework for

further analyzing the benefits of network-enabled weapons. The paper will conclude by offering recommendations to streamline this capability to the warfighter.

DTIC

Detectors; Networks; Ammunition; Precision Guided Projectiles

20070013690 Draper (Charles Stark) Lab., Inc., Houston, TX, USA

XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network

Novotny, John; Karpov, Igor; Zhang, Chendi; Bedrossian, Nazareth S.; [2007]; 3 pp.; In English; 2003 International Symposium on Collaborative Technologies and Systems, 19-24 Jan. 2003, Orlando, FL, USA

Contract(s)/Grant(s): NAS9-01069; Copyright; Avail.: Other Sources; Abstract Only

In this paper, the XNsim approach to achieve Internet-enabled, dynamically scalable collaborative distributed simulation capabilities is presented. With this approach, a complete simulation can be assembled from shared component subsystems written in different formats, that run on different computing platforms, with different sampling rates, in different geographic locations, and over single/multiple networks. The subsystems interact securely with each other via the Internet. Furthermore, the simulation topology can be dynamically modified. The distributed simulation uses a combination of hub-and-spoke and peer-to-peer network topology. A proof-of-concept demonstrator is also presented. The XNsim demonstrator can be accessed at <http://www.jsc.draper.com/xn> that hosts various examples of Internet enabled simulations.

Author

Internets; Topology; Computer Networks; Computerized Simulation; Distributed Processing

63

CYBERNETICS, ARTIFICIAL INTELLIGENCE AND ROBOTICS

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also *54 Man/System Technology and Life Support*.

20070012798 Naval Postgraduate School, Monterey, CA USA

Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle

Miller, Benjamin D; Dec 2006; 111 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462650; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA462650>

Improvised Explosive Devices (IED's) continue to kill and seriously injure military members throughout the Iraqi theatre. Autonomous Ground Vehicle (AGV) seeks to identify the human presence placing the IED and then report that contact to a unit of action. This research developed a semiautonomous platform that can navigate to waypoints, avoid obstacles, investigate possible threats and then detect motion that triggers a visual camera. The information is then relayed back to the user and can trigger a variety of actions. AGV has been tested in numerous environments with a wide range of success. It is limited by the communication range from its standard 802.11G router and the continuous availability of the global positioning system. Terrain with extensive peaks and valleys is not ideal for the current platform. However, for detecting the human presence that is consistent with IED placement, AGV is well suited.

DTIC

Autonomy; Explosive Devices; Explosives Detection; Personnel; Robotics

20070012865 Naval Research Lab., Washington, DC USA

A Logical Language for Specifying Cryptographic Protocol Requirements

Syverson, Paul; Meadows, Catherine; Jan 1993; 14 pp.; In English

Report No.(s): AD-A463014; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463014>

In this paper we present a formal language for specifying and reasoning about cryptographic protocol requirements. We give examples of simple sets of requirements in that language. We look at two versions of a protocol that might meet those requirements and show how to specify them in the language of the NRL Protocol Analyzer. [Mea91] [Mea92] We also show how to map one of our sets of formal requirements to the language of the NRL Protocol Analyzer and use the Analyzer to show

that one version of the protocol meets those requirements. In other words, we use the Analyzer as a model checker to assess the validity of the formulae that make up the requirements.

DTIC

Cryptography; Protocol (Computers)

20070012866 Naval Research Lab., Washington, DC USA

The NRL Protocol Analyzer: An Overview

Meadows, Catherine A; Jan 1994; 10 pp.; In English

Report No.(s): AD-A463016; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463016>

The NRL Protocol Analyzer is a prototype special-purpose verification tool, written in Prolog, that has been developed for the analysis of cryptographic protocols that are used to authenticate principals and services and distribute keys in a network. In this paper we give an overview of how the Analyzer works and describe its achievements so far. We also show how our use of the Prolog language benefited us in the design and implementation of the Analyzer.

DTIC

Cryptography; Protocol (Computers)

20070012872 Georgia Inst. of Tech., Atlanta, GA USA

Comparative Analysis of Kernel Methods for Statistical Shape Learning

Rathi, Yogesh; Dambreville, Samuel; Tannenbaum, Allen; Jan 2006; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463031; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463031>

Prior knowledge about shape may be quite important for image segmentation. In particular, a number of different methods have been proposed to compute the statistics on a set of training shapes, which are then used for a given image segmentation task to provide the shape prior. In this work, we perform a comparative analysis of shape learning techniques such as linear PCA, kernel PCA, locally linear embedding and propose a new method, kernelized locally linear embedding for doing shape analysis. The surfaces are represented as the zero level set of a signed distance function and shape learning is performed on the embeddings of these shapes. We carry out some experiments to see how well each of these methods can represent a shape, given the training set.

DTIC

Image Processing; Kernel Functions; Shapes

20070012880 SRI International Corp., Menlo Park, CA USA

The Vision Problem: Exploiting Parallel Computation

Fischler, Martin A; Firschein, Oscar; Barnard, Stephen T; Fua, Pascal V; Leclerc, Yvan; Feb 28, 1989; 65 pp.; In English

Contract(s)/Grant(s): MDA903-86-C-0084; DCA76-85-C-0004

Report No.(s): AD-A463043; SRI-TN-458; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463043>

This technical report consists of an introductory paper and three technical papers presented at the session, 'AI Application of Supercomputers: The Vision Problem,' at the Fourth International Conference on Supercomputing, Santa Clara, California, April 30 to May 5, 1989.

DTIC

Computation; Computer Vision; Image Processing; Optimization

20070012901 SRI International Corp., Menlo Park, CA USA

Coarse Coding for Material and Object Identification

Laws, Kenneth I; Jul 1988; 28 pp.; In English

Contract(s)/Grant(s): MDA903-86-C-0084; DACA76-85-C-0004

Report No.(s): AD-A463077; SRI-TN-442; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463077>

A new coarse-coding technique is presented for labeling image pixels and regions to match exemplars or multivariate material signatures. This multinomial classification method can be used for object cueing and tracking, as well as for material identification and image segmentation. Pixels are classified--and classification reliability can be estimated--with only

single-band histograms and one pass through each image band. An example of four-class labeling illustrates the power of this two-level classification algorithm.

DTIC

Classifications; Coding; Image Processing; Marking; Pixels

20070012919 Georgia Inst. of Tech., Atlanta, GA USA

Shape-Based Approach to Robust Image Segmentation Using Kernel PCA

Dambreville, Samuel; Rathi, Yogesh; Tannenbaum, Allen; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): U54-EB005149; NAC-P41-RR-13218

Report No.(s): AD-A463105; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463105>

Segmentation involves separating an object from the background. In this work, we propose a novel segmentation method combining image information with prior shape knowledge, within the level-set framework. Following the work of Leventon et al., we revisit the use of principal component analysis (PCA) to introduce prior knowledge about shapes in a more robust manner. To this end, we utilize Kernel PCA and show that this method of learning shapes outperforms linear PCA, by allowing only shapes that are close enough to the training data. In the proposed segmentation algorithm, shape knowledge and image information are encoded into two energy functionals entirely described in terms of shapes. This consistent description allows to fully take advantage of the Kernel PCA methodology and leads to promising segmentation results. In particular, our shape-driven segmentation technique allows for the simultaneous encoding of multiple types of shapes, and offers a convincing level of robustness with respect to noise, clutter, partial occlusions, or smearing.

DTIC

Computer Vision; Factor Analysis; Imaging Techniques; Kernel Functions; Shapes

20070012952 Mitre Corp., Bedford, MA USA

Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises

Mathieu, Jennifer; Hwang, Grace; Duniak, James; Jun 2006; 18 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463214; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463214>

PROBLEM FORMULATION: (1) In a dynamic, complex threat environment, agile responses from Command and Control are needed -- especially for cross-scale interaction; (2) Biologically-inspired methods based on individual behavior to population response dynamics will be explored for coupling scales; (3) Sensor Enterprise Proof-of-Concept: * The Sensor Enterprise Scales * Air Operation Center (AOC) Scales * Develop agent-based models to investigate biologically-inspired methods for coupling/exploitation; (4) Map threats in the Sensor Enterprise to optimal scale coupling method for agile response capability; (5) Extension to other domains (disaster response, distributed operations).

DTIC

Biological Effects; Biomimetics; Biotechnology; Command and Control; Complex Systems; Detection; Exploitation

20070012971 Space and Naval Warfare Systems Center, San Diego, CA USA

PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology

Lange, Douglas S; Jun 2006; 25 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463319; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463319>

The Defense Advanced Research Projects Agency (DARPA) has implemented a program to build the first instance of a complete cognitive agent. The program, called Personalized Assistant that Learns (PAL), is expected to yield new cognitive technology of significant value to the military. Like any good assistant, PAL must learn by observing its human master and by accepting explicit advice and instruction. With traditional engineering projects evaluation can be done in a straightforward manner determining if the documented requirements of the system have been met. Agent-based capabilities and other network centric capabilities complicate matters because the environment that they will operate under constantly changes. Add to that complication, the ability to learn new capabilities, and testing whether or not a new agent is ready to be deployed becomes a problem beyond the current state of art and practice. This paper lays out the problem in such a way as to identify the key issues for evaluation, transition, and acquisition. By doing so, research can be targeted for the problem and solutions found.

An initial experiment design is proposed as well to examine the role that evaluation will play towards transitioning cognitive systems that learn into the military environment.

DTIC

Artificial Intelligence; Deployment; Education; Learning; Weapon Systems

20070012985 Paine Coll., Augusta, GA USA

Metrics for Uncertainty in Organizational Decision-Making

Lawless, W F; Chaudron, Laurent; Abubucker, C P; Jun 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463373; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463373>

An agent's behavior is guided by static information from observation that has converged into a stable world view, whether in human-social or computational-agent reality. Examples of convergent world views for human agents abound as single-sided stories, strongly held religious beliefs, well-defended political perspectives, or situation awareness. These are simple, mostly linear rational descriptions of the phenomena. However, the common interaction experienced between two or more human agents reflects the need to construct bi-sided perspectives for multi-agent systems, which until now have remained mathematically intractable. To advance the mathematics of social interaction, we propose that only bi-sided or quantum computational agents will be capable of replicating social phenomena such as the dynamics of human agents, including the more difficult problem of organizational decision-making.

DTIC

Decision Making; Organizations; Robots

20070013145 Carnegie-Mellon Univ., Pittsburgh, PA USA

Modeling Dynamics and Exploring Control of a Single-Wheeled Dynamically Stable Mobile Robot with Arms

Scheerer, Eric M; Aug 31, 2006; 60 pp.; In English

Report No.(s): AD-A462904; AFIT-CI07-0008; CMU-RI-TR-06-37; No Copyright; Avail.: CASI: [A04](#), Hardcopy

This paper focuses on simulations of a dynamically stable mobile robot (Ballbot) with arms. The simulations are of Ballbot lifting its arms in various directions. A PD arm controller works independently of an LQR-designed balancing/station keeping controller. The PD controller drives the arms to follow desired trajectories. When the arms are raised, Ballbot assumes a leaning equilibrium (the physical equilibrium) as opposed to the standing equilibrium (body stands totally upright - a predefined desired equilibrium) that the LQR drives toward. The conflict - between these two equilibria causes the robot to lose its balance when lifting heavy (10 kg) loads. A unified arm and station keeping/balancing controller is also described. The unified controller outperforms the independent controllers in some cases. Balancing only using arms and driving body movement with arms are briefly explored.

DTIC

Dynamic Control; Robots

20070013158 New Mexico State Univ., Las Cruces, NM USA

Exploring the Relationship Between Distributed Training, Integrated Learning Environments, and Immersive Training Environments

Lee, Adrienne Y; Jan 2007; 33 pp.; In English

Contract(s)/Grant(s): FA8650-04-1-6529; Proj-1123

Report No.(s): AD-A463181; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The original goal of this paper was to review the literature on the new areas of integrated learning environments and immersive training environments, as well as distance and team training and intelligent tutoring systems research, and evaluate the feasibility of integrating these ideas.

DTIC

Computer Assisted Instruction; Education; Surveys

20070013193 Netherlands Defence Academy, Breda, Netherlands

Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice

de Jong, J L; Grant, Tim J; Jun 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463261; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The paper compares the state of the art in two different problem areas: artificial intelligence (AI) theory and the practice

of military planning. In particular, hybrid metaheuristic scheduling and the operational decision-making process are compared. Although very different in nature, they share a striking number of commonalities resulting from their focus on real-world problems. This paper proposes ways in which each field could benefit from the other.

DTIC

Artificial Intelligence; Military Operations; Planning

20070013197 RAND Corp., Santa Monica, CA USA

Facilitating Informed Decisionmaking: The E-DEL+I(trademark) Analytic Technique

Wong, Carolyn; Jun 2006; 25 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463281; No Copyright; Avail.: Defense Technical Information Center (DTIC)

E-DEL+I is an analytic technique that facilitates informed decisionmaking: (1) Applicable to complex issues that involve multiple dimensions (technical, political, military, cost, return on investment, legal, or other aspects); (2) Can blend technical expertise and understanding of military operations/doctrine/policy to arrive at a balanced solution acceptable to all stakeholders; (3) Especially effective when critical data must be derived from information that resides in the collective knowledge base of many individuals and organizations.

DTIC

Augmentation; Decision Making; Integrators

20070013661 Ben Gurion Univ. of the Negev, Beersheva, Israel

Spatial and Temporal Point Tracking in Real Hyperspectral Images

Rotman, Stanley; Aminov, Benjamin; Nichtern, Ofir; Aug 26, 2006; 153 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-03-1-3077

Report No.(s): AD-A462953; No Copyright; Avail.: CASI: A08, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462953>

The scope of this project addresses the problem of tracking a dim moving point target from a sequence of hyperspectral cubes. The resulting tracking algorithm is useful for many staring technologies such as the ones used in space surveillance and missile tracking applications. In these applications, the images consist of targets moving at sub-pixel velocity and noisy background consisting of evolving clutter and noise. The demand for a low false alarm rate (FAR) on one hand and a high probability of detection (PD) on the other makes the tracking a challenging task. The use of hyperspectral images should be superior to current technologies using broadband IR images due to the ability of exploiting simultaneously two target specific properties: the spectral target characteristics and the time dependent target behavior. The proposed solution consists of three stages: the first stage transforms the hyperspectral cubes into a two dimensional sequence, using known point target detection acquisition methods; the second stage involves a temporal separation of the 2D sequence into sub-sequences and the usage of a variance filter (VF) to detect the presence of targets from the temporal profile of each pixel in each group, while suppressing clutter specific influences. This stage creates a new sequence containing a target with a seemingly faster velocity; the third stage applies the Dynamic Programming Algorithm (DPA) that proves to be a very effective algorithm for the tracking of moving targets with low SNR at around pixel velocity. The system is tested on both synthetic and real data.

DTIC

Imagery; Optical Tracking; Target Acquisition; Algorithms

20070013716 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Space Crew-Collaborative Task Scheduling

Jaap, John; Meyer, Patrick; Davis, Elizabeth; Richardson, Lea; [2007]; 13 pp.; In English; Original contains black and white illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013716>

For all past and current human space missions, the final scheduling of tasks to be done in space has been devoid of crew control, flexibility, and insight. Ground controllers, with minimal input from the crew, schedule the tasks and uplink the timeline to the crew or uplink the command sequences to the hardware. Prior to the International Space Station (ISS), the crew could make requests about tomorrow's timeline, they could omit a task, or they could request that something in the timeline be delayed. This lack of control over one's own schedule has had negative consequences. There is anecdotal consensus among astronauts that control over their own schedules will mitigate the stresses of long duration missions. On ISS, a modicum of crew control is provided by the job jar. Ground controllers prepare a task list (a.k.a. 'job jar') of non-conflicting tasks from which jobs can be chosen by the in space crew. Because there is little free time and few interesting non-conflicting activities,

the task-list approach provides little relief from the tedium of being micro-managed by the timeline. Scheduling for space missions is a complex and laborious undertaking which usually requires a large cadre of trained specialists and suites of complex software tools. It is a giant leap from today's ground prepared timeline (with a job jar) to full crew control of the timeline. However, technological advances, currently in-work or proposed, make it reasonable to consider scheduling a collaborative effort by the ground-based teams and the in-space crew. Collaboration would allow the crew to make minor adjustments, add tasks according to their preferences, understand the reasons for the placement of tasks on the timeline, and provide them a sense of control. In foreseeable but extraordinary situations, such as a quick response to anomalies and extended or unexpected loss of signal, the crew should have the autonomous ability to make appropriate modifications to the timeline, extend the timeline, or even start over with a new timeline. The Vision for Space Exploration (VSE), currently being pursued by the National Aeronautics and Space Administration (NASA), will send humans to Mars in a few decades. Stresses on the human mind will be exacerbated by the longer durations and greater distances, and it will be imperative to implement stress-reducing innovations such as giving the crew control of their daily activities.

Derived from text

Spacecrews; Space Exploration; Autonomy; Scheduling; Computer Programs; Tasks

64

NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20070011433 California Inst. of Tech., Pasadena, CA USA

Flocking for Multi-Agent Dynamic Systems: Algorithms and Theory

Olfati-Saber, Reza; Jun 22, 2004; 38 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462317; CIT-CDS-2004-005; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462317>

In this paper, we present a theoretical framework for design and analysis of distributed flocking algorithms. Two cases of flocking in free-space and presence of multiple obstacles are considered. We present three flocking algorithms: two for free-flocking and one for constrained flocking. A comprehensive analysis of the first two algorithms is provided. We demonstrate the first algorithm embodies all three rules of Reynolds. This is a formal approach to extraction of interaction rules that lead to the emergence of collective behavior. We show that the first algorithm generically leads to regular fragmentation, whereas the second and third algorithms both lead to flocking. A systematic method is provided for construction of cost functions (or collective potentials) for flocking. These collective potentials penalize deviation from a class of lattice-shape objects called alpha-lattices. We use a multi-species framework for construction of collective potentials that consist of flock-members, or alpha-agents, and virtual agents associated with alpha-agents called beta and gamma -agents. We show that the tracking/migration problem for flocks can be solved using an algorithm with a peer-to-peer architecture. Each node (or macro-agent) of this peer-to-peer network is the aggregation of all three species of agents. The implication of this fact is that flocks need no leaders. We discuss what constitutes flocking and provide a universal definition of flocking for particle systems that has the same role as Lyapunov stability for nonlinear dynamical systems. By universal, we mean independent of the method of trajectory generation for particles. Various simulation results are provided that demonstrate the effectiveness of our novel algorithms and analytical tools. This includes performing 2-D and 3-D flocking, split/rejoin maneuver, and squeezing maneuver for 40 to 150 agents (e.g. particles and UAVs).

DTIC

Algorithms; Design Analysis; Distributed Processing

20070011435 California Inst. of Tech., Pasadena, CA USA

A Unified Analytical Look at Reynolds Flocking Rules

Saber, Reza O; Sep 4, 2003; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-1-0361; F33615-98-C-3613

Report No.(s): AD-A462292; CIT-CDS-03-014; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462292>

No abstract available

Reynolds Number; Numerical Analysis

20070011450 NASA Johnson Space Center, Houston, TX, USA

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals

Fink, Patrick W.; Wilton, Donald R.; Khayat, Michael A.; [2007]; 4 pp.; In English; IEEE Antennas and Propagation International, 10-15 Jun. 2007, Honolulu, HI, USA; Copyright; Avail.: CASI: [A01](#), Hardcopy

Recently, significant progress has been made in the handling of singular and nearly-singular potential integrals that commonly arise in the Boundary Element Method (BEM). To facilitate object-oriented programming and handling of higher order basis functions, cancellation techniques are favored over techniques involving singularity subtraction. However, gradients of the Newton-type potentials, which produce hypersingular kernels, are also frequently required in BEM formulations. As is the case with the potentials, treatment of the near-hypersingular integrals has proven more challenging than treating the limiting case in which the observation point approaches the surface. Historically, numerical evaluation of these near-hypersingularities has often involved a two-step procedure: a singularity subtraction to reduce the order of the singularity, followed by a boundary contour integral evaluation of the extracted part. Since this evaluation necessarily links basis function, Green's function, and the integration domain (element shape), the approach ill fits object-oriented programming concepts. Thus, there is a need for cancellation-type techniques for efficient numerical evaluation of the gradient of the potential. Progress in the development of efficient cancellation-type procedures for the gradient potentials was recently presented. To the extent possible, a change of variables is chosen such that the Jacobian of the transformation cancels the singularity. However, since the gradient kernel involves singularities of different orders, we also require that the transformation leaves remaining terms that are analytic. The terms 'normal' and 'tangential' are used herein with reference to the source element. Also, since computational formulations often involve the numerical evaluation of both potentials and their gradients, it is highly desirable that a single integration procedure efficiently handles both.

Author

Singular Integral Equations; Singularity (Mathematics); Integrals; Boundary Element Method; Green's Functions; Object-Oriented Programming

20070011468 Clemson Univ., SC USA

Generating Epsilon-Efficient Solutions in Multiobjective Programming

Engau, Alexander; Wiecek, Margaret M; Oct 2005; 20 pp.; In English

Report No.(s): AD-A462601; TR2005_10_EWB; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462601>

Scalarization approaches to purposely generating epsilon-efficient solutions of multiobjective programs are investigated and a generic procedure for computing these solutions is proposed and illustrated with an example. Real-life decision making situations in which the solutions are of significance are described.

DTIC

Multiprogramming; Numerical Analysis; Distributed Processing

20070011469 GE Global Research Center, Niskayuna, NY USA

Fusing Competing Prediction Algorithms for Prognostics (Preprint)

Goebel, Kai; Eklund, Neil; Bonanni, Pierino; Mar 2006; 12 pp.; In English

Contract(s)/Grant(s): HR0011-04-C-0001; Proj-M02R

Report No.(s): AD-A462559; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462559>

Two fundamentally different approaches can be employed to estimate remaining life in faulted components. One is to model from first principles the physics of fault initiation and propagation. Such a model must include detailed knowledge of material properties, thermodynamic and mechanical response to loading, and the mechanisms for damage creation and growth. Alternatively, an empirical model of condition-based fault propagation rate can be developed using data from experiments in which the conditions are controlled or otherwise known and the component damage level is carefully measured. These two approaches have competing advantages and disadvantages. However, fusing the results of the two approaches produces a result that is more robust than either approach alone. In this paper, we introduce an approach to fuse competing prediction algorithms for prognostics. Results presented are derived from rig test data wherein multiple bearings were first seeded with small defects, then exposed to a variety of speed and load conditions similar to those encountered in aircraft engines, and run until the ensuing material liberation accumulated to a predetermined damage threshold or cage failure, whichever occurred first.

DTIC

Algorithms; Mechanical Properties

20070011471 Texas Univ., Austin, TX USA

An Advanced Tabu Search Approach to the Airlift Loading Problem

Roesener, August G; Dec 2006; 183 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462430; No Copyright; Avail.: CASI: [A09](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462430>

This dissertation details an algorithm to solve the Airlift Loading Problem (ALP). Given a set of cargo to be transported from an aerial port of embarkation to one or more aerial ports of debarkation, the ALP seeks to pack the cargo items onto pallets (if necessary), partition the set of cargo items into aircraft loads, select an efficient and effective set of aircraft from available aircraft, and to place the cargo in allowable positions on those aircraft. The ALP differs from most partitioning and packing problems described in the literature because, in addition to spatial constraints, factors such as allowable cabin load, balance, and temporal restrictions on cargo loading availability and cargo delivery requirements must be considered. While classical methods would be forced to attack such problems in a hierarchical fashion by solving a sequence of related subproblems, this research develops an algorithm to simultaneously solve the combined problem by employing an advanced tabu search approach.

DTIC

Algorithms; Loads (Forces); Air Cargo; Aircraft Industry

20070012840 Georgia Inst. of Tech., Atlanta, GA USA

Particle Filtering With Dynamic Shape Priors

Rathi, Yogesh; Dambreville, Samuel; Tannenbaum, Allen; Jan 2006; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462966; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA462966>

Tracking deforming objects involves estimating the global motion of the object and its local deformations as functions of time. Tracking algorithms using Kalman filters or particle filters have been proposed for tracking such objects, but these have limitations due to the lack of dynamic shape information. In this paper, we propose a novel method based on employing a locally linear embedding in order to incorporate dynamic shape information into the particle filtering framework for tracking highly deformable objects in the presence of noise and clutter.

DTIC

Algorithms; Kalman Filters; Shapes

20070012910 Technion - Israel Inst. of Tech., Haifa, Israel

Optimal Integration of Estimation and Guidance for Interceptors

Shinar, Josef; Oshman, Yaakov; Turetsky, Vladimir; Jun 2, 2005; 107 pp.; In English

Contract(s)/Grant(s): F61775-01-C-0007; F61775-01-WE018

Report No.(s): AD-A463089; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463089>

This report summarizes a multi-year investigation effort resulting in an innovative integrated estimation/guidance design algorithm for the interception of randomly maneuvering targets using noise-corrupted measurements. The algorithm is based on separating the tasks of model identification, state reconstruction and change detection, as well as assigning them to different estimators. The selection of the appropriate estimator for providing guidance information is accomplished by explicit logic-based use of the time-to-go. The homing guidance is performed by a differential game-based bounded control guidance law, modified for enhancing its efficiency in the terminal phase. The algorithm was derived using a planar linearized model, but it was implemented and validated in a generic nonlinear three-dimensional ballistic missile defense scenario. The simulation results demonstrate an exceptional homing performance improvement compared to earlier results and a potential to achieve hit-to-kill accuracy.

DTIC

Estimates; Estimating; Guidance (Motion)

20070012945 Air Force Research Lab., Wright-Patterson AFB, OH USA

Multidisciplinary Computational Research

Visbal, Miguel R; Jul 2006; 10 pp.; In English

Report No.(s): AD-A463199; AFRL-VA-WP-TM-2006-3197; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463199>

The purpose of this work is to develop advanced multidisciplinary numerical simulation capabilities for aerospace vehicles with emphasis on highly accurate, massively parallel computational methods for Direct and Large-Eddy simulation of turbulence, flow control, aero-acoustics and nonlinear fluid/structure interactions. These technical objectives directly support AFRL Air Vehicles Directorate's Capability Focused Tech Investment in persistent ISR, Strike and Multi-Role Mobility thrusts.

DTIC

Aerospace Vehicles; Multidisciplinary Research; Numerical Analysis; Simulation

20070012969 Naval Postgraduate School, Monterey, CA USA

Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment

Looney, John P; Nissen, Mark E; Jun 2006; 48 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463314; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463314>

The Edge represents a fresh approach to organizational design, moving knowledge and power to the edges of organizations. But this raises issues in terms of comparative performance with respect to alternate organizational designs. The research described in this article extends our investigation into the design and efficacy of Edge organizations for current and future, military, mission-environmental contexts. We begin with field research at sea with a coalition expeditionary strike group, observing in particular the planning process associated with maritime tasking orders, and focusing in particular on the effects of networking, knowledge and power flows. Such field research is used to develop and validate a computational model of the current maritime component commander organization and planning process. Through computational experimentation, the nature of this organization and process are analyzed to assess the relative strengths and weaknesses of alternate communication capabilities, knowledge networks and power flows. New work described in this article reveals insightful dynamic patterns and differential performance capabilities of various C2 organizations. This work suggests immediate results amenable to practical application in the Military, and it suggests also an exciting agenda for continued research along the lines of this investigation.

DTIC

Analysis (Mathematics); Computer Networks; Mathematical Models; Models; Organizations; Warfare

20070012990 Connecticut Univ., Storrs, CT USA

A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments

Yu, Feili; Ruan, Sui; Candra, Meirina; Kleinman, David; Pattipati, Krishna R; Jun 2006; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-0101; N00014-06-1-080

Report No.(s): AD-A463381; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463381>

Based on the holonic C2 organizational control architecture (OCA) that models a C2 organization as an integration of multi-level, de-centralized decision making networks, we present a holonic multi-objective evolutionary algorithm (MOEA) that produces robust and flexible distributed schedules within a dynamic ESG mission environment, such as asset break down, appearance of new events, node failures, etc. The lower level units generate multiple local schedules based on local resources, constraints, and interests (objectives). These local schedules correspond to a schedule pool, from which the Operational Unit can assemble a set of ranked L-Neighboring global schedules according to global objectives, and the actual schedule can shift among different stages of alternative schedules in order to adapt to environmental changes. Global feasibility is ensured at the upper level operational unit, while local autonomies are maintained among lower tactical level units due to the characteristics of the proposed holonic organizational control architecture (OCA). The advantage of this scheduling scheme is that it generates multiple neighboring candidate schedules, which avoids the costly replanning process and also minimizes the adaptation cost.

DTIC

Algorithms; Command and Control; Electrostatic Gyroscopes; Military Operations; Organizations; Scheduling

20070013281 Army Research Lab., Aberdeen Proving Ground, MD USA

Constraints on the Grueneisen Theory

Segletes, Steven B; Feb 2007; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463507; ARL-TR-4041; No Copyright; Avail.: CASI: [A03](#), Hardcopy

While the Grueneisen theory was developed from statistical theory, it is unclear which results of statistical mechanics are intrinsically part of the macroscopic Grueneisen theory and which may be dispensed with by users of the macroscopic theory. Several constraints on entropy and specific heat, arising from the Grueneisen theory, are developed herein. Not surprisingly, such constraints are compatible with the underlying statistical theory. Nonetheless, having been derived from macroscopic thermodynamic considerations, they represent constraints that must apply to any macrothermodynamic model expressing the Grueneisen function as being independent of temperature. An alternate formulation for the Grueneisen function is also presented.

DTIC

Equations of State; Numerical Analysis

20070013292 Army Research Lab., Aberdeen Proving Ground, MD USA

An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves

Laverty, Richard R; Gazonas, George A; Jan 2007; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-62105AH84

Report No.(s): AD-A463526; ARL-RP-160; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A parametric study of composite strips leads to systems of partial differential equations, coupled through interface conditions, that are naturally solved in Laplace transform space. Because of the complexity of the solutions in transform space and the potential variations due to geometry and materials, a systematic approach to inversion is necessarily numerical. The Dubner-Abate-Crump (DAC) algorithm is the standard in such problems and is implemented. The presence of discontinuous wavefronts in the problems considered leads to Gibbs phenomenon; which, in turn, overestimates the values of maximum stress. These errors are mitigated by use of Lanczos' sigma-factors, which combine naturally with the DAC algorithm.

DTIC

Elastic Waves; Fourier Series; Inversions; Laplace Transformation; Transformations (Mathematics); Viscoelasticity

20070013295 Advanced Information Engineering Services, Brooks City-Base, TX USA

A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models

Mishra, Ashutosh; Joshi, Ravindra P; Schoenbach, Karl H; Clark, III, C D; Aug 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F41624-01-C-7002; Proj-7757

Report No.(s): AD-A463532; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Realistic and accurate numerical simulations of electro-stimulation of tissues and full-body biomodels have been developed and implemented. Typically, whole-body systems are very complex and consist of a multitude of tissues, organs, and subcomponents with diverse properties. From an electrical standpoint, these can be characterized in terms of separate conductivities and permittivities. Accuracy demands good spatial resolution; thus, the overall tissue/animal models need to be discretized into a fine-grained mesh. This can lead to a large number of grid points (especially for a three-dimensional entity) and can place prohibitive requirements of memory storage and execution times on computing machines. Here, the authors include a simple yet fast and efficient numerical implementation. It is based on LU decomposition for execution on a cluster of computers running in parallel with distributed storage of the data in a sparse format. In this paper, the details of electrical tissue representation, the fast algorithm, the relevant biomodels, and specific applications to whole animal studies of electro-stimulation are discussed.

DTIC

Bioelectricity; Computerized Simulation; Electric Potential; Factorization; Parallel Processing (Computers); Time Dependence

20070013301 Illinois Univ., Urbana-Champaign, IL USA

From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms

Goldberg, David E; May 31, 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0129; Proj-2304

Report No.(s): AD-A463557; No Copyright; Avail.: CASI: [A03](#), Hardcopy

These goals have been substantially accomplished. Moreover, new findings led to important discoveries that were

unanticipated at the beginning of the project. The report starts with a retrospective examination of project accomplishment. 1) Develop, implement, and enhance probabilistic model-building GAs for non-binary codes. 2) Extend existing facet wise models to non-binary codes. 3) Extend bounding test functions to non-binary code. 4) Extend the proposed non-binary algorithms to hierarchically difficult problems. 5) Apply the developed algorithms to two problems of Air Force interest.

DTIC

Algorithms; Genetic Algorithms; Machine Learning; Models; Pattern Recognition

20070013465 Department of the Navy, Washington, DC USA

Method for Real Time Matched Field Processing

Bernecky, W R, Inventor; Jan 30, 2007; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-D020279; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This patent application discloses a method for computing real-time matched field responses. The method utilizes a matched-field processing algorithm and requires two data inputs. The first data input is measured acoustic data from a sonar set of hydrophones. The second data input is a predicted data set, or replica data set, against which the measured data are compared. Multiple replicas are compared to the measured data and the closest match is retained. The closest match of the replica is presumed to characterize the data in some important way (e.g., a source location). More specifically, the output of a sensor of the towed array is translated to the frequency domain by applying a discrete Fourier transform (DFT) or a Fast Fourier transform (FFT) to a set of contiguous time samples. A replica vector is the frequency domain $N \times 1$ vector representing the predicted or expected values at each sensor of the sensor array for a specific frequency. The corresponding output of the method is an ambiguity surface. The ambiguity surface is a set of numbers ranging between zero and one with each number corresponding to a specific location in the ocean. The highest values on the ambiguity surface indicate the most likely position of an acoustic source. The matched-field response is generalized by averaging the response over multiple frequencies. A response for an array may be computed by forming beams and then combining them by multiplying each by an eigenray factor before summing. The computation of the response may be further defined by Voxel interpolation.

DTIC

Acoustic Properties; Hydrophones; Patent Applications; Position (Location); Position Sensing; Real Time Operation; Signal Processing; Sonar

65

STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20070011439 Library of Congress, Washington, DC USA

U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations

Fischer, Hannah; Apr 26, 2005; 7 pp.; In English

Report No.(s): AD-A462704; CRS-RS22126; No Copyright; Avail.: CASI: [A02](#), Hardcopy

This report provides several estimates of difficult-to-find casualty statistics from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Operation Enduring Freedom includes ongoing operations in Afghanistan, operations against terrorists in other countries, and operations supporting foreign efforts to defeat terrorists. Operation Iraqi Freedom includes the invasion of Iraq and all subsequent operations in Iraq. The Department of Defense regularly updates total U.S. military deaths and wounded statistics from OIF and OEF. These updates are reflected in CRS Report RS21578, 'Iraq: Summary of U.S. Casualties.' Daily updates can be found at [<http://www.defenselink.mil/news/>], while more detailed information can be found at [<http://www.dior.whs.mil/mmid/casualty/castop.htm>]. However, the Department of Defense does not publicly release numbers on Iraqi civilian deaths, Iraqi security forces deaths, or medical evacuations of U.S. military personnel outside of Iraq. Statistics on these topics are sometimes available through alternative sources, such as nonprofit organizations or the press. Many of the statistics included in this report are incomplete or have been released by nongovernmental sources. Readers should exercise caution when using these statistics and should look on them as guideposts rather than as statements of historical fact. This report will be updated as needed.

DTIC

Casualties; Statistical Analysis; Military Personnel; Iraq

20070012806 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Robust Estimation of Mahalanobis Distances in Hyperspectral Images

Meidunas, Eduardo C; Dec 2006; 280 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462686; AFIT/DS/ENG/07-02; No Copyright; Avail.: CASI: [A13](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462686>

This dissertation develops new estimation methods that fit Johnson distributions and generalized Pareto distributions to hyperspectral Mahalanobis distances. The Johnson distribution fit is optimized using a new method which monitors the second derivative behavior of exceedance probability to mitigate potential outlier effects. This univariate distribution is then used to derive an elliptically contoured multivariate density model for the pixel data. The generalized Pareto distribution models are optimized by a new two-pass method that estimates the tail-index parameter. This method minimizes the mean squared fitting error by correcting parameter values using data distance information from an initial pass. A unique method for estimating the posterior density of the tail-index parameter for generalized Pareto models is also developed. Both the Johnson and Pareto distribution models are shown to reduce fitting error and to increase computational efficiency compared to previous models.

DTIC

Distance; Estimates; Imagery

20070012965 Aptima, Inc., Woburn, MA USA

A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams

Entin, Elliot E; Weil, Shawn A; Jun 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-99-C-0255

Report No.(s): AD-A463297; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463297>

We focus on a means to code voice communications and derive communication measures because communication plays such a critical role in military decision making and mission accomplishment. Voice communication has proved labor intensive to code manually and, beyond simple counts of utterances, has proved relatively intractable to automate coding even for powerful computers. The methodology we describe has the potential to alleviate a significant portion of the current coding burden. It only assumes there is a technology to count the number of utterances per trial. The process involves randomly selecting a subsample from a larger data set, manually coding the subsample using standard manual coding procedures to produce a small set of communication measures, constructing regression models using corrected part-whole correlations to predict each communication measure from the number of utterances, and applying the models to predict communication measures for the remaining part of the data set. This methodology was tested using data from a recent study. Results revealed acceptable corrected part-whole correlations and subsequent regression models. Moreover, predicted communication scores from the subsample based regression models showed similar communication patterns found for scores derived from the whole sample. Implications of these finds are discussed.

DTIC

Coding; Regression Analysis; Voice Communication

20070013310 APT Research, Inc., Huntsville, AL USA

Approved Methods and Algorithms for DoD Risk-Based Explosives Siting

Harwick, Meredith J; Hall, John; Tatom, John W; Baker, Robert G; Feb 2, 2007; 321 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): GS-23F-0153L; Proj-W912DY-05-F0047

Report No.(s): AD-A463571; DDESB-TP-14-REV3; No Copyright; Avail.: CASI: [A14](#), Hardcopy

The Safety Assessment for Explosives Risk (SAFER) model was developed to provide a more comprehensive assessment of the overall risk associated with explosives operations and storage. The SAFER model calculates risk in terms of the statistical expectation for loss of life from an explosives event. Three components are multiplied to estimate annual maximum probability of fatality, $P(f)$, and the expected fatalities, $E(f)$: (1) the probability of an explosives event, $P(e)$, (2) the probability of a fatality given an event, $P(f/e)$, and (3) the average exposure of an individual, $E(p)$. The purpose of this technical paper is to present the underlying logic and algorithms used in risk-based explosives safety analyses, as implemented in the Safety Assessment for Explosives Risk (SAFER) Version 3.0 model.

DTIC

Algorithms; Explosives; Risk; Safety

20070013667 Geological Survey, Reston, VA USA, Bureau of Reclamation, Washington, DC, USA
Summary of Survival Data from Juvenile Coho Salmon in the Klamath River, Northern California, 2006
January 2007; 14 pp.; In English
Report No.(s): PB2007-106892; USGS-OFR-2007-1023; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Little is known about the survival of ESA-listed juvenile coho salmon during their seaward migration in the lower Klamath River. In 2006, the Bureau of Reclamation funded a study to estimate the survival of radio-tagged juvenile coho salmon in the Klamath River downstream of Iron Gate Dam. A series of models were evaluated to determine if survival varied between hatchery and wild fish and among several river reaches between the dam river kilometer 33, a total distance of 276 kilometers. The results from 2006, the first year of study, indicated little support for differences in survival between hatchery and wild fish and lower survival in the most upstream reach than in those farther downstream. This document is a brief summary of survival results to date.

NTIS

Fishes; Rivers; Survival

66

SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20070011475 Isaac Newton Inst. for Mathematical Sciences, Cambridge, UK

Workshop: Theory and Applications of Coupled Cell Networks

Ashwin, P; Coombes, S; Dawes, J H; Golubitsky, M; Mar 22, 2006; 21 pp.; In English

Contract(s)/Grant(s): FA8655-05-1-5062

Report No.(s): AD-A462647; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462647>

Coupled cell systems fitted naturally into the general theme of the Isaac Newton Institute (INI) programme Pattern Formation in Large Domains (PFD) that was held from August to December 2005. In addition to the workshop reported on here, the programme contained a training course aimed at research students and recent post-docs and three further workshops, on experimental results in physical systems, theoretical aspects, and patterns in fluid dynamics, broadly interpreted. The programme, and associated workshops had a substantial international profile, indicating the wide-ranging interest in the themes and challenges under discussion. In summary, the main themes of the workshop were: 1) The dynamics of coupled cell networks (synchronisation, pattern formation, clustering, chaotic behaviour, heteroclinic dynamics). 2) The role of network architecture and topology on network dynamics (symmetry groups, groupoids, motifs, layers of different cell types) 3) Application to and inspiration from physics and biology (neural dynamics, neural field theories, continuum vs discrete models, existence and stability of travelling waves.) A brief summary of the timetable for the workshop is given in this report.

DTIC

Networks; Coupled Modes; Topology; Architecture (Computers)

20070011732 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Software Development Cost Estimation Executive Summary

Hihn, Jairus M.; Menzies, Tim; July 18, 2006; 9 pp.; In English; NASA Software Assurance Symposium Annual Meeting, 18-20 Jul. 2006, Morgantown, WV, USA; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39827>

Identify simple fully validated cost models that provide estimation uncertainty with cost estimate. Based on COCOMO variable set. Use machine learning techniques to determine: a) Minimum number of cost drivers required for NASA domain based cost models; b) Minimum number of data records required and c) Estimation Uncertainty. Build a repository of software cost estimation information. Coordinating tool development and data collection with: a) Tasks funded by PA&E Cost Analysis; b) IV&V Effort Estimation Task and c) NASA SEPG activities.

Derived from text

Cost Estimates; Software Engineering; Computer Programming; Cost Effectiveness; Cost Analysis

20070012896 California Inst. of Tech., Pasadena, CA USA

H(infinity) Control of Nonlinear Systems: A Class of Controllers

Lu, Wei-Min; Doyle, John C; May 13, 1993; 43 pp.; In English

Report No.(s): AD-A463068; CIT-CDS-93-008; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463068>

Abstract The standard state space solutions to the Em control problem for linear time invariant systems are generalized to nonlinear time-invariant systems. A class of nonlinear -controllers are parameterized as nonlinear fractional transformations on contractive, stable free nonlinear parameters. As in the linear case, the E, control problem is solved by its reduction to four simpler special state space problems, together with a separation argument. Another byproduct of this approach is that the sufficient conditions for control problem to be solved are also derived with this machinery. The solvability for nonlinear H infinity-control problem requires positive definite solutions to two parallel decoupled Hamilton-Jacobi inequalities and these two solutions satisfy an additional coupling ‘ condition. An illustrative example, which deals with a passive plant, is given at the end.

DTIC

Controllers; Electromagnetic Radiation; Nonlinear Systems; Nonlinearity

20070012922 Defense Advanced Research Projects Agency, Arlington, VA USA

Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies

Allen, John G; Corpac, Peter S; Frisbie, Kevin R; Jun 2006; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463112; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463112>

The Defense Advanced Research Projects Agency and the U.S. Joint Forces Command are developing transformational technologies to enhance the capability of military commanders and their civilian counterparts to plan and conduct effects-based campaigns. It is expected that, in future conflicts, Commanders and non-military leaders will need to simultaneously apply all means of National power, both military and nonmilitary, to achieve a coherent set of military and non-military effects against the adversary. The commander and leaders will need to act in multiple domains concurrently and conduct integrated and interdependent actions. The campaign plan may cover several years of effort and will consist of the objectives and actions necessary along multiple lines of effort; it will be characterized by extensive, complex interdependencies. This program is developing a tool to help construct and manage such plans and manage the large array of interdependencies. Commanders and leaders must also understand the adversary’s various political, military (air, land and sea; regular or irregular), economic, social, information distribution, infrastructure, etc. systems and the complex interactions amongst these systems. The program is developing an analytical tool to help evaluate the benefits and consequences of alternative actions. Collectively, the tools will aid commanders in collaboratively visualizing the complex interdependencies in plans and the connectivity between alternative actions and effects. Two contractor teams led by BAE Systems and Lockheed Martin have developed the first version of these tools and have conducted experiments to verify and quantify the contribution of the tools when employed by command center personnel (military and civilian) in realistic (albeit simulated) environments.

DTIC

Contingency; Decision Support Systems; Military Operations; Planning

20070012937 Spectra Research Systems, Inc., Arlington, VA USA

Collaborative Awareness: Experiments with Tools for Battle Command

Scrocca, James; Molz, Maureen; Kott, Alexander; Jun 2006; 41 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463166; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463166>

In this paper, we report on the findings of recent experiments conducted by the Multicell and Dismounted Command and Control (M&D C2) program jointly conducted by Defense Advanced Research Projects Agency (DARPA) and the US Army to investigate operational implications of using a new approach to battle command and control (C2). The approach is predicated on synthesized and analyzed information presented to the commander and staff organized into a small command cell. We present an experimental design, and data collection and analysis methodology that allows for exploration of the cognitive processes of the commanders and staff. The experimental methodology helped the program team to determine and analyze the factors that influenced the decision making and collaboration processes of the commanders and staffs in the tasks of battle command.

DTIC

Command and Control; Decision Support Systems

20070012955 Science Applications International Corp., San Diego, CA USA

Advanced Visualization for Operational Assessment (Briefing Charts)

Alvidrez, Sonia; Hale, Christopher R; Loreaux, Richard H; Monk, Donald; Jun 2006; 19 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463258; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463258>

Decision-quality support to assessment team in defining critical indicators, managing assessment data, determining operational effectiveness, visualizing/understanding complexity and uncertainty.

DTIC

Charts; Evaluation; Flow Visualization; System Effectiveness

20070012957 Connecticut Univ., Storrs, CT USA

Model-Based Organization Analysis and Design for an ESG Organization

Meirina, Candra; Yu, Feili; Pattipati, Krishna R; Kleinman, David L; Jun 2006; 33 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-010

Report No.(s): AD-A463267; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463267>

The concept of Expeditionary Strike Groups (ESGs) arose to satisfy the requirements of global war on terrorism (GWOT), when it was realized that surface warfare capabilities were needed to complement the capability of the Amphibious Ready Groups (ARGs). The addition of cruiser (CG), destroyer (DDG), frigate (FFG), and submarine (SSN) assets to those of an ARG, which include an amphibious assault ship (LHA or LHD) with a Marine expeditionary unit (MEU), a dock landing ship (LSD) and an amphibious transport dock ship (LPD) provide the ESG with a highly mobile, self-sustaining force. This addition also provides the capability for an ESG to deploy independently, as well as a part of a larger joint force. The primary goal for the introduction of ESG organizational concept is to find suitable ways to integrate the Navy and Marine forces. These include exploring evolving non-traditional C2 structures, and developing the corresponding new capabilities (including introduction of new offensive and defensive weaponry). The merger between the two forces and the resulting C2 philosophy has to take into account various operational and cultural issues. In this paper, we propose systematic, but somewhat simplified, analysis of an ESG organization that allows us to abstract the mission environment, and to glean various organizational issues of interest via a model-based organizational analysis framework. The heart of the proposed framework is the utilization of an agent-based simulation to capture key organizational processes, and identify strengths and potential limitations of an organization. Based on the assessment, a set of recommendations are put forth to mitigate the potential limitations. This approach is an extension of our model-based organizational design and analysis framework, wherein an organization and its mission environment are abstracted in terms of three modeling components: decision-makers (DMs-C2 nodes), assets, and tasks.

DTIC

Command and Control; Computerized Simulation; Coordination; Electrostatic Gyroscopes; Leadership; Military Operations; Mission Planning; Simulation

20070012960 Mitre Corp., McLean, VA USA

Thin Thread Analysis

Martinez, Charlie; Sullivan, Shelby; Mullins, Ken; Jun 21, 2006; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463274; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463274>

The Net-Centric Operating Environment (NCOE) Joint Integration Concept (JIC) study focused on Joint Task Force operations with the context of a Major Combat Operation. It defined three interrelated capability areas -- (1) knowledge management, (2) network management, and (3) information assurance -- and three enabling constructs -- (1) information transport, (2) enterprised services, and (3) applications. The Capabilities-Based Assessment (CBA), the Thin Thread Analysis, by MITRE focuses on activities, information/data, operational entities and communities of interest (COI). The objective of the Thin Thread project was to create an architecture-based process as a tool to support capabilities-based planning, assessment and acquisitions.

DTIC

Threads; User Requirements

20070012979 Massachusetts Inst. of Tech., Cambridge, MA USA

Re-Architecting the DOD Acquisition Process: Transition to the Information Age

Brown, Kevin; Jun 2006; 59 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463330; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463330>

The military is in the midst of significant change due to the Department of Defense (DoD) Transformation Planning Guidance, a significant part of which is the implementation of Network-Centric Warfare (NCW) theory. Unfortunately, the existing DoD acquisition process poorly develops the weapons and other systems needed to realize the full potential of transformation in NCW. The current military acquisition process was designed around, and was effective for, the pre-transformational platform-centric military structure. The military's fundamental shift to network-centric systems, made possible by the information age, will require broad changes in both the organization and policy of the DoD development process. The goal of this paper is to present a new acquisition system that will align the DoD development process with the transformation guidance, while integrating state-of-the-art business practice and technology solutions. This paper reviews the DoD Transformation Planning Guidance and the NCW transformation goal, and compares them to the transformation roadmaps of the Army, Navy, and Air Force. J. Forrester type system dynamics models are used to describe the various existing acquisition systems. Finally, the process yields a recommended alternative acquisition architecture to efficiently implement DoD transformation guidance while supporting the development of net-centric capabilities.

DTIC

Acquisition; Defense Program; Military Operations; Planning; Warfare

20070013194 Mitre Corp., McLean, VA USA

Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment

Doescher, Craig T; Johnson, Eric M; Hamm, Wesley; Jun 2006; 31 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463270; No Copyright; Avail.: CASI: A03, Hardcopy

The Army Modeling and Simulation Executive Council (AMSEC) recognized the requirement for a distributed modeling and simulation (M&S) capability across Army commands in March 2003. A 2-star level Memorandum of Understanding (MOU) among the U.S. Army Training and Doctrine Command (TRADOC), U.S. Army Test and Evaluation Command (ATEC), and U.S. Army Research, Development and Engineering Command, (RDECOM) formally documents this requirement in July 2003. The DUSA (OR) tasked the PM UA M&S Management Office (MSMO) to ensure compatibility among the respective M&S capabilities of TRADOC, RDECOM, ATEC, and the FCS Lead Systems Integrator (LSI) in order to support concept exploration, systems integration, analysis, and acquisition of the FCS Brigade Combat Team (BCT) System-of-Systems (SoS). This initiated the creation of an Army M&S and data environment that satisfies the requirement for a distributed M&S capability for all three commands and the LSI. This initiative is defined as the Cross Command Collaboration Effort (3CE) and is codified in a supporting MOA signed in December 2004. An initial step in developing a process to establish a consistent set of tools, data and business processes was the 3CE M&S analysis conducted in August 2005. This analysis, sponsored by TRADOC, used a distributed, live, virtual, and constructive (LVC) environment to identify best of breed between selected systems for inclusion in the 3CE toolbox. Battle command was one of the functional areas assessed. The team analyzed two battle command surrogate systems. This paper provides an overview of the distributed LVC environment along with the methodology used to conduct the analysis, lessons learned and recommendations on how this process should be used to support future assessments.

DTIC

Models; Simulation; Systems Analysis

20070013206 TRADOC Systems Analysis Activity, White Sands Missile Range, NM USA

Radio Path Prediction Software for Command and Control Scenario Developers

Shattuck, Michael; Jun 2006; 43 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463304; No Copyright; Avail.: CASI: A03, Hardcopy

In recent years, there has been great interest in incorporating the modeling of communication systems into combat simulations. However, development of supporting software tools for command and control (C2) scenario developers has not kept pace with the progress in combat simulation software. Scenario developers cannot easily experiment with alternate locations for base station repeaters/switches nor can they easily predict in advance where mobile platforms will experience communication failure. This information is crucial for scenario developers to plan and design scenarios to test proposed networked combat systems. A proof of concept software radio path prediction application has been written in the Java programming language that allows a scenario developer to quickly answer these what if? questions. This software allows users

to easily predict the significant propagation paths from a base station to a mobile station, as well as which paths will be compromised or ineffective. This presentation discusses the theory and concepts behind the application.

DTIC

Command and Control; Models; Simulation; Software Development Tools

20070013217 Industrial Coll. of the Armed Forces, Washington, DC USA

Net-Centric, Enterprise-Wide System-of-Systems Engineering and the Global Information Grid

Kaplan, Jeremy; May 4, 2006; 48 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463360; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Very large organizations employ large numbers of intelligent, aggressive, and hardworking people; yet often seem to produce disappointing results. Net-centric, enterprise-wide system-of-systems engineering addresses aspects of this problem from integrated social, organizational, and technical perspectives. It provides an explanation for many systemic problems, provides a framework for thinking about the development of systems-of-systems within and across large enterprises, and provides an approach to improving interoperability, integration, and operational capabilities. This paper summarizes the theory, applies it to DoD's Global Information Grid, and makes recommendations for improving the development of DoD information systems.

DTIC

Communication Networks; Interoperability; Systems Engineering

20070013258 Naval War Coll., Newport, RI USA

Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst

Christie, James L; May 17, 2005; 24 pp.; In English

Report No.(s): AD-A463463; No Copyright; Avail.: CASI: [A03](#), Hardcopy

While Operations Analysis is routinely used at major shore commands to help support future programmatic decisions and determine lessons learned from post-combat analysis, it is rarely used at the operational level and specifically at the JTF. To improve JTF effectiveness and enhance operational planning efficiency, JTFs warrant an Operations Analyst (the JTF Combat Analyst) capable of employing analytical models, methods and techniques. Operations Analysis dates back to World War II and it originated in the North Atlantic when the allies were trying to protect convoys from ruthless German wolfpacks. A Combat Analyst is a pro-active planner who applies analytical tools and critical thinking in order to frame alternatives and aid the warfighting commander make effective decisions based on sound analytical analysis. Using different analytical tools, a Combat Analyst contributes during both the Deliberate Planning Process and Crisis Action Planning. A Combat Analyst assist the JTF Commander in determining objectives, measures of effectiveness, expected results from various COAS and make educated estimates of potential enemy COAs. A requirement exists for real time, fast and accurate combat analysis at the JTF. A Combat Analyst is the solution.

DTIC

Combat; Military Operations; Operations Research; Planning; Warfare

20070013313 North Carolina State Univ., Raleigh, NC USA

Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modelling

Banks, H T; Luke, N S; Dec 14, 2006; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0220

Report No.(s): AD-A463576; NCSU-CRSC-TR06-29; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We report on two recent advances in the modelling of viscoelastic polymers: (i) a new constitutive model which combines the virtual stick-slip continuum 'molecular-based' ideas of Johnson and Stacer with the Rouse with the Rouse bead chain ideas; (ii) a two-dimensional version of a model that accounts for stenosis-driven shear wave propagation in biotissue.

DTIC

Mathematical Models; Phenomenology; Polymers; Viscoelasticity; Wave Propagation

20070013328 SNPE Propulsion, Vert-Le-Petit , France

Aging Properties of An HTPB Propellant

Neviere, Robert; Apr 20, 2002; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F61775-01-W-E072

Report No.(s): AD-A463618; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The mechanical properties of an HTPB propellant are observed during the aging process of this material including different conditions of temperature and humidity. The report concerns the results of initial time and after an aging duration of 6 months under conditions of +50 degrees C and +20 degrees C for relative humidity of Hr76% Hr33% and in dry air. The mechanical properties observed are more precisely the crack propagation capability of the material but for modelisation and numerical calculation purposes, the material is also tested in uniaxial tension at different strain rates, in simple shear for one strain rate and in the volumetric characterization test (uniaxial tension in the Ferris gaz dilatometer) for different strain rates. To allow a complete viscoelastic description, the material is also tested in the uniaxial tension relaxation test for different imposed elongations. The program scope is to perform a crack propagation numerical simulation in the Air Force Research Laboratory using the high performance numerical tools available there for an SNPE formulated material.

DTIC

Aging (Materials); Fuels; HTPB Propellants; Mechanical Properties; Propellants

20070013344 Air Force Research Lab., Rome, NY USA

Intent Driven Adversarial Modeling

Gilmore, Duane A; Krause, Lee S; Lehman, Lynn A; Santos, Jr , Eugene; Zhao, Qunhua; Jun 2005; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-04-C-0118

Report No.(s): AD-A463701; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Modern elements of military intelligence and decision making require predictions of adversary force actions and reactions to provide a complete and realistic viewpoint. Current methods for providing realistic adversary force simulation are largely manual processes. Adversarial simulation requires continual assessment of friendly courses of action and is currently human assessment capability limited. To develop a computational model of dynamic adversary behaviors that includes the ability to integrate with intelligence and mission data sources, computational models must address operational patterns, behaviors, or doctrines of present-day adversaries (terrorist cells, local insurgents, guerillas, and armed thugs) as well as more conventional force elements. The dynamic nature of adversary force behavior with respect to the changing capabilities, biases, beliefs, goals, intentions, and perceptions of friendly force actions must be addressed. The Emergent Adversarial Modeling System (EAMS) addresses these elements through explicit focus on adversarial intent as a driver for adversarial response. Specific capabilities address the changing nature of adversary composition. This paper will discuss the results of the ongoing EAMS research project into adversarial modeling and adversarial response simulation.

DTIC

Computerized Simulation; Intelligence; Mathematical Models

20070013516 University of Southern California, Los Angeles, CA USA

Integer Programming Decoder for Machine Translation

Knight, K.; Yamada, K.; 28 Apr 06; 8 pp.; In English

Contract(s)/Grant(s): DARPA-ITO-N66001-00-1-9814

Patent Info.: Filed Filed 28 Apr 06; US-Patent-Appl-SN-11-414-774

Report No.(s): PB2007-101669; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A machine translation (MT) decoder may transform a translation problem into an integer programming problem, such as a Traveling Salesman Problem (TSP). The decoder may invoke an integer program (IP) solver to solve the integer programming problem and output a likely decoding based on the solution.

NTIS

Decoders; Integers; Machine Translation; Linear Programming

20070013600 Defence Research and Development Canada, Ottawa, Ontario Canada

Identifying Potential Implications of Technologies on Military and Security Options

Webb, Robert N; Goodman, Leonard; Staples, Brian; Hughes, Steven; Jun 2006; 50 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463285; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Identifying and assessing the potential implications of emerging, disruptive and surprise technologies on military planning and security operations, linking them with future military and security concepts is highly complex. Technology surprise occurs through rapidly emerging technologies and the use of commercial technologies in military and security operations and by adversaries. Predicting the use of traditional, novel or the combination of these technologies in both asymmetric warfare and

public security has not yet been solved. The use of war game scenarios has been suggested, but the resources to carry this out are thought to be too extensive for just one or two nations to fulfill. The writing of future operational scenarios have been also suggested, since war-fighting / peacekeeping capabilities in the future might be predicted by setting a future geopolitical/environmental context, but this requires extensive knowledge in many interdisciplinary fields that might be beyond most forces individual capacity to mount. A full cooperative effort by allies is considered the best way ahead. The challenge is to assess the potential implications of these technologies on military and security operations, linking them with future military concepts. The military needs to be involved in terms of 'effects' or 'impacts' not just technologies.

DTIC

Forecasting; Identifying; Military Operations; Planning; Security

20070013628 Space and Naval Warfare Systems Command, San Diego, CA USA

Quantification of Subjective Information Assessments in C2 Decision Option Selection

Cowen, Michael B; Fleming, Robert A; Jun 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463117; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463117>

Two of the more subjective processes in decision making involve forming an opinion about each decision-relevant information item (i.e., the impact and importance of that item to any decision option) and then selecting one option based upon some form of cognitive weighting of the entire information pool. The decision support package described here simplifies and quantifies these two processes by supplying an intuitive interface to capture: (1) location of the information item (2) content of the information item (3) quality of the information (4) timeliness of the information (5) decision option impacted (6) nature of that impact and (7) the importance of the item. Using a weighting matrix, the subjective assessments of impact and importance for each information item are converted into single score and then all the information item scores for a particular decision option are summed. The final total scores are used to quantitatively assess the ranking all the various decision options. An exchange module makes all assessments available to all participants, enabling the group to quickly focus on the key differing individual assessments causing any lack of group consensus.

DTIC

Decision Support Systems; Information Theory

20070013649 Naval Research Lab., Washington, DC USA

Developing a Viable Approach for Effective Tiered Systems

Dahlburg, Jill; Bielecki, Daria; Bowles, Jeff; Byers, Jeff; Colton, Richard; Dwyer, Christopher; Bevilacqua, Richard; Boris, Jay; Brown, Jack; Cole, Ray; Jan 17, 2007; 56 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463357; NRL/MR/1001--07-9024; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Tremendous learning opportunities presently exist to understand how to realize net-centric operations. The ability to share information to and from the tactical edge will allow operators to work in more dispersed environments while taking decisive, collective actions. However, to realize this vision there are significant S&T issues that must be resolved. Possibilities of net-behavior must be better understood in order to shape future DoD net-centric systems technologies and operations concepts, to define with stability the defense industry after next, and -- centrally -- to develop the future tactics, techniques, and procedures that will enable net-centric advantages to be effected at the tactical, operational and ultimately strategic levels. Near-term success will be realized by proceeding with scenario-driven experimentally-based tiered systems development and demonstration activities that are co-evolved in small development cells staffed with cohesive teams of Service Lab technologists and Operational/Tactical war fighters who are chartered to work collaboratively for four to five consecutive years.

DTIC

Military Technology; Systems Analysis; Technology Assessment

20070013670 Johns Hopkins Univ., Laurel, MD USA

Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project

North, Paul D; Forsythe, Steven L; Barnes, Valerie B; Jun 2006; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463195; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This paper presents the initial results of a multi-year, independent research and development command and control (C2) evaluation project. The purpose of the project is to develop and demonstrate a Multi-resolution Modeling Evaluation

Framework (MRMEF), for evaluating whether or not the application of net-centric principles to C2 improves the effectiveness and efficiency of C2 in a complex, hybrid architectural environment. The MRMEF uses scenarios to bound the mission space to be evaluated and employs simulation techniques using multiple levels of fidelity or resolution to evaluate net-centric C2. This year's effort focused on the development of a high-level set of C2 processes depicting red and blue force activities in a Weapon of Mass Effect scenario. A constructive simulation was created using those processes to represent an as-is or non-net-centric model of that scenario. The simulation was executed and mission outcome results recorded. Two of the C2 processes were instantiated as real web services to represent a rudimentary form of a to-be , i.e. net-centric, environment. A series of experiments were conducted to measure the time to complete each of these processes. The results were fed back into the simulation and an analysis performed to compare the as-is vs. to-be environments.

DTIC

Command and Control; Models; Research and Development; Systems Analysis

67

THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

20070011465 California Inst. of Tech., Pasadena, CA USA

Motion from Fixation

Soatto, Stefano; Perona, Pietro; Feb 1995; 32 pp.; In English

Contract(s)/Grant(s): N00014-93-1-0990

Report No.(s): AD-A462343; CIT-CDS-95-006; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462343>

We study the problem of estimating rigid motion from a sequence of monocular perspective images obtained by navigating around an object while fixating a particular feature point. The motivation comes from the mechanics of the human eye, which either pursues smoothly some fixation point in the scene, or 'saccades' between different fixation points. In particular, we are interested in understanding whether fixation helps the process of estimating motion in the sense that it makes it more robust, better conditioned or simpler to solve. We cast the problem in the framework of 'dynamic epipolar geometry', and propose an implicit dynamical model for recursively estimating motion from fixation. This allows us to compare directly the quality of the estimates of motion obtained by imposing the fixation constraint, or by assuming a general rigid motion, simply by changing the geometry of the parameter space while maintaining the same structure of the recursive estimator. We also present a closed-form static solution from two views, and a recursive estimator of the absolute attitude between the viewer and the scene.

DTIC

Motion; Rigidity; Recursive Functions

20070013139 Brown Univ., Providence, RI USA

High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws

Costa, Bruno; Don, Wai S; Jan 30, 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): 300315/98-8; FG02-98ER25346

Report No.(s): AD-A458926; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this article we present a high resolution hybrid central finite difference-WENO scheme for the solution of conservation laws, in particular, those related to shock turbulence interaction problems. A sixth order central finite difference scheme is conjugated with a fifth order weighted essentially non-oscillatory WENO scheme in a grid-based adaptive way. High Order Multi-Resolution analysis is used to detect the high gradients regions of the numerical solution in order to capture the shocks with the WENO scheme while the smooth regions are computed with the more efficient and accurate central finite difference scheme. The application of high order filtering to mitigate the dispersion error of central finite difference schemes is also discussed. Numerical experiment with the 1D compressible Euler equations are shown.

DTIC

Conservation Laws; Difference Equations; Finite Difference Theory; Numerical Analysis

20070013215 George Mason Univ., Fairfax, VA USA

On Applying Point-Interval Logic to Criminal Forensics (Student Paper)

Ishaque, Mashhood; Zaidi, Abbas K; Levis, Alexander H; Jun 2006; 33 pp.; In English; Original contains color illustrations
Report No.(s): AD-A463356; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Application of a temporal logic to forensic analysis, especially in answering certain investigative questions related to time-sensitive information, is presented. A set of temporal facts is taken from the London bombing incident that took place on July 7, 2005, to illustrate the approach. The information used in the illustration is gathered through the online news sites. A hypothetical investigation on the information is carried out to identify certain time intervals of potential interest to crime investigators. A software tool called Temper that implements temporal logic is used.

DTIC

Software Development Tools; Students

20070013224 Sandia National Labs., Albuquerque, NM USA

Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective

Senglaub, Michael; Feb 2006; 27 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DE-AC04-94AL85000

Report No.(s): AD-A463385; No Copyright; Avail.: CASI: [A03](#), Hardcopy

What we have identified is a suite of technologies that together define a solution to fusion which captures a reasoning model that supports fusion. It is this approach that is needed if we are to capture the human capability of performing fusion which has at its core a reasoning function. It is a hybridization of formal and temporal concept reasoning, Peircean reasoning with an instantiation of Mills canons, Modal logic and coupled to an architecture based on Hawkins model of the neocortex. The solution concept will have significant impact on sensor development and a major impact on information architecture design. The effort supporting this effort is working towards a 70-80 percent solution to demonstrate the capabilities and the feasibility of linkage of the technologies.

DTIC

Decision Making; Detection; Multisensor Fusion; Set Theory

20070013294 Air Force Research Lab., Hanscom AFB, MA USA

Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions

Jasperse, John R; Basu, Bamandas; Lund, Eric J; Bouhram, Mehdi; Nov 20, 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2311

Report No.(s): AD-A463529; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A new fluid theory in the guiding-center and gyrotropic approximation derivable from the ensemble-averaged Vlasov-Maxwell equations that included the effect of wave-particle interactions for weakly turbulent, weakly inhomogeneous, nonuniformly magnetized plasma was recently given by Jasperse, Basu, Lund, and Bouhram [Phys. Plasmas 13, 072903 (2006)]. In that theory, the particles are transported in one spatial dimension (the distances along the magnetic field) but the turbulence is two-dimensional. In this paper, which is intended as a sequel, the above theory is used for quasi-steady conditions...

DTIC

Birkeland Currents; Fluid Mechanics; Gyrotropism; Heating; Ions; Turbulence

70

PHYSICS (GENERAL)

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see *categories 71 through 77*. For related instrumentation see *35 Instrumentation and Photography*; for geophysics, astrophysics, or solar physics see *46 Geophysics, 90 Astrophysics, or 92 Solar Physics*.

20070011407 Naval Postgraduate School, Monterey, CA USA

A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact

Delaney, Luc D; Dec 2006; 71 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462418; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462418>

The purpose of this thesis was to develop an experimental methodology to determine the effects of electromigration on the aluminum microstructure of the railgun armature. An experimental system which allowed simulation of an Al armature between two Cu rails with surface skins was devised. The system was designed small enough such that only small current (10A) was necessary to produce the large current densities typically found in railguns, and was able to simulate the skin effect on both the Cu rails and Al armature under static, long-term testing conditions. In this method, the effects of electromigration were discerned clearly, in dissociation from various movement related damage phenomena. The aluminum from the armature quickly reached its melting point via Joule heating due to high contact resistance at the armature-rail contact. Once liquid aluminum was formed, it rapidly migrated along the copper rail towards the negative terminal. This transport of liquid aluminum along the copper rails was attributed to electromigration of the liquid under the influence of the direct electric field. Once the aluminum began to be transported along the rail towards the cathode terminal, it alloyed with the copper rails and the resistance steadily increased in the circuit. Electromigration is shown to be a contributing factor to the degradation of aluminum armatures performance and copper rails lifespan in the railgun.

DTIC

Aluminum Alloys; Copper Alloys; Electromigration; Railgun Accelerators

20070011502 Honeywell International, Inc., Morristown, NJ, USA

Pseudo Tunnel Junction

Katti, R. R.; 10 Jan 04; 15 pp.; In English

Contract(s)/Grant(s): DTRA01-00-C-0002

Patent Info.: Filed Filed 10 Jan 04; US-Patent-Appl-SN-10-754 881

Report No.(s): PB2007-103289; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention provides for a tunneling magnetoresistive element and a method of reading a logical state of the element. An embodiment of the magnetoresistive element, for example, provides a tri-layer device having a storage layer, a sense layer and a barrier layer. The storage layer is a conducting, magnetic layer having a magnetization direction along an easy axis of the element. The storage layer is configured such that its magnetization direction will invert in response to an externally applied magnetic field of at least a first threshold strength. The binary state of the tunneling element is determinable from the magnetization direction of the storage layer. The sense layer is also a conducting, magnetic layer having a magnetization direction along the easy axis of the element. The sense layer is configured such that its magnetization direction will invert in response to an externally applied magnetic field of at least a second threshold strength. The sense layer is designed with a lower coercivity than the storage layer, thus the second threshold strength is less than the first threshold strength.

NTIS

Electron Tunneling; Magnetic Storage; Tunnel Junctions

20070011517 Carr and Ferrell, LLP, Palo Alto, CA, USA

Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth

Gu, G.; Pan, L.; Zhang, L.; 16 Sep 04; 15 pp.; In English

Patent Info.: Filed Filed 16 Sep 04; US-Patent-Appl-SN-10-943 321

Report No.(s): PB2007-101624; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A catalyst material for carbon nanotube synthesis includes a uniform dispersion of host particles on a substrate. The host particles themselves include catalyst nanoparticles that are effective to catalyze nanotube synthesis reactions and provide nucleation sites. Methods for preparing catalyst materials include co-sputtering a catalytic species and a host species to form a precursor thin film on a substrate, followed by an oxidation reaction of the precursor thin film in air. The precursor thin film can be patterned on the substrate to limit the locations of the catalyst material to well-defined areas. Methods for nanotube synthesis employ CVD in conjunction with the catalyst materials of the invention. During the synthesis, the catalyst nanoparticles catalyze carbon nanotubes to grown from a carbon-containing gas.

NTIS

Carbon Nanotubes; Nanostructure Growth; Substrates; Catalysts

20070011557 Knobbe Martens Olson and Bear, LLP, Irvine, CA, USA

Nanosimeter Based on Single Ion Detection

Bashkirov, V.; Schulte, R. W.; Shchemelinin, S.; Breskin, A.; Chechik, R.; 20 Jul 04; 20 pp.; In English

Contract(s)/Grant(s): DAMD17-97-2-7016

Patent Info.: Filed Filed 20 Jul 04; US-Patent-Appl-SN-10-894 873

Report No.(s): PB2007-101601; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A nanodosimeter device (15) for detecting positive ions induced in a sensitive gas volume by a radiation field of primary particle, comprising an ionization chamber (10) for holding the sensitive gas volume to be irradiated by the radiation field of primary particles; an ion counter system connected to the ionization chamber (10) for detecting the positive ions which pass through the aperture opening and arrive at the ion counter (12) at an arrival time; a particle tracking system for position-sensitive detection of the primary particles passing through the sensitive gas volume; and a data acquisition system capable of coordinating the readout of all data signals and of performing data analysis correlating the arrival time of the positive ions detected by the ion counter system relative to the position sensitive data of primary particles detected by the particle tracking system. The invention further includes the use of the nanodosimeter for method of calibrating radiation exposure with damage to a nucleic acid within a sample. A volume of tissue-equivalent gas is radiated with a radiation field to induce positive ions. The resulting positive ions are measured and compared with a determination of presence or extent of damage resulting from irradiating a nucleic acid sample with an equivalent dose of radiation.

NTIS

Detection; Ions; Dosimeters; Nanotechnology

20070011558 Wells Saint John, P.S, Spokane, WA, USA

Ion Mobility Spectrometry Method and Apparatus

Hill, H. H.; Tam, M.; 14 Oct 04; 19 pp.; In English

Contract(s)/Grant(s): DAAD190216350

Patent Info.: Filed Filed 14 Oct 04; US-Patent-Appl-SN-10-966 325

Report No.(s): PB2007-101602; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The invention includes an ion mobility spectrometer having a liquid filled drift chamber. The chamber has an ionization region partitioned from and an ion separation region by a reversible ion-migration block. An electrical field within the chamber allows ions to migrate toward the electrode collector. Passage of ions from the ionization region is triggered by reversing the block allowing ions to migrate into the ion separation region. The invention includes a method of ion mobility analysis in liquid phase. Ions are mobilized to migrate through a drift liquid and are detected at an end of a drift chamber. The invention also includes a method of generating ions in a sample. A sample containing molecules in a first solvent is introduced into a second solvent through a charged capillary where the electrically charged sample is electro-disperses to ionize the molecules.

NTIS

Mobility; Spectrometers; Ions

20070011575 Lawrence Livermore National Lab., Livermore, CA USA

Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing

Sharp, W. M.; Grote, D. P.; Cohen, R. H.; Friedman, A.; Vay, J. L.; Aug. 16, 2006; 7 pp.; In English

Report No.(s): DE2006-894003; UCRL-PROC-223745; No Copyright; Avail.: National Technical Information Service (NTIS)

Contamination from electrons is a concern for the solenoid-focused ion accelerators being developed for experiments in high-energy-density physics (HEDP). These electrons are produced directly by beam ions hitting lattice elements and intercepting diagnostics, or indirectly by ionization of desorbed neutral gas, and they are believed responsible for time dependence of the beam radius, emittance, and focal distance seen on the Solenoid Transport Experiment (STX) at Lawrence Berkeley National Laboratory. The electrostatic particle-in-cell code WARP has been upgraded to include the physics needed to simulate electron-cloud phenomena. We present preliminary self-consistent simulations of STX experiments suggesting that the observed time dependence of the beam stems from a complicated interaction of beam ions, desorbed neutrals, and electrons.

NTIS

Electron Clouds; High Current; Ion Accelerators; Simulation; Solenoids

20070011579 Lawrence Livermore National Lab., Livermore, CA USA

Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations

Pruet, J.; Brown, D. A.; Beck, B.; McNabb, D. P.; Jan. 18, 2006; 8 pp.; In English

Report No.(s): DE2006-894331; UCRL-PROC-218223; No Copyright; Avail.: Department of Energy Information Bridge

The nuclear data infrastructure currently relies on punch-card era formats designed some five decades ago. Though this system has worked well, recent interest in non-traditional and complicated physics processes has demanded a change. Here we present an alternative approach under development at LLNL. In this approach data is described through collections of distinct and self-contained simple data structures. This structure-based format is compared with traditional ENDF and ENDL, which can roughly be characterized as dictionary-based representations.

NTIS

Data Bases; Simulation; Data Structures

20070011583 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Ethernet Based Embedded System for FEL Diagnostics and Controls

Yan, J.; Sexton, D.; Moore, W.; Grippo, A.; Jordan, K.; January 2006; 5 pp.; In English

Report No.(s): DE2006-894059; No Copyright; Avail.: Department of Energy Information Bridge

An Ethernet based embedded system has been developed to upgrade the Beam Viewer and Beam Position Monitor (BPM) systems within the free-electron laser (FEL) project at Jefferson Lab. The embedded microcontroller was mounted on the front-end I/O cards with software packages such as Experimental Physics and Industrial Control System (EPICS) and Real Time Executive for Multiprocessor System (RTEMS) running as an Input/Output Controller (IOC). By cross compiling with the EPICS, the RTEMS kernel, IOC device supports, and databases all of these can be downloaded into the microcontroller. The first version of the BPM electronics based on the embedded controller was built and is currently running in our FEL system. The new version of BPM that will use a Single Board IOC (SBIOC), which integrates with an Field Programming Gate Array (FPGA) and a ColdFire embedded microcontroller, is presently under development. The new system has the features of a low cost IOC, an open source real-time operating system, plug&play-like ease of installation and flexibility, and provides a much more localized solution.

NTIS

Diagnosis; Ethernet; Free Electron Lasers

20070011584 Institute of Gas Technology, Chicago, IL, USA

Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report

Chudnovsky, Y.; Sep. 2006; 113 pp.; In English

Report No.(s): DE2006-894062; No Copyright; Avail.: National Technical Information Service (NTIS)

Most approaches to increasing heat transfer rates in the convection sections of gas-fired process heaters involve the incorporation of fins, baffles, turbulizers, etc. to increase either the heat transfer surface area or turbulence or both. Although these approaches are effective in increasing the heat transfer rates, this increase is invariably accompanied by an associated increase in convection section pressure drop as well as, for heaters firing dirty fuel mixtures, increased fouling of the tubes both of which are highly undesirable. GTI has identified an approach that will increase heat transfer rates without a significant increase in pressure drop or fouling rate. Compared to other types of heat transfer enhancement approaches, the proposed dimpled tube approach achieves very high heat transfer rates at the lowest pressure drops. Incorporating this approach into convection sections of chemical industry fired process heaters may increase energy efficiency by 3-5%. The energy efficiency increase will allow reducing firing rates to provide the required heating duty while reducing the emissions of CO₂ and NO_x.

NTIS

Chemical Engineering; Heat Transfer; Heaters; Industries

20070011585 Lawrence Livermore National Lab., Livermore, CA USA

Solving the Quasi-Static Field Model of the Pulse-Line Accelerator; Relationship to a Circuit Model

Friedman, A.; Feb. 08, 2006; 10 pp.; In English

Report No.(s): DE2006-893987; UCRL-TR-218776; No Copyright; Avail.: Department of Energy Information Bridge

The Pulse-Line Ion Accelerator (PLIA) is a promising approach to high-gradient acceleration of an ion beam at high line charge density (1, 2, 3, 4, 5, 6). A recent note by R. J. Briggs (7) suggests that a 'sheath helix' model of such a system can be solved numerically in the quasi-static limit. Such a model captures the correct macroscopic behavior from 'first principles' without the need to time-advance the full Maxwell equations on a grid. This note describes numerical methods that may be used to effect such a solution, and their connection to the circuit model that was described in an earlier note by the author (8). Fine detail of the fields in the vicinity of the helix wires is not obtained by this approach, but for purposes of beam dynamics simulation such detail is not generally needed.

NTIS

Circuits; Static Models

20070011590 Lawrence Livermore National Lab., Livermore, CA USA

T-REX Design Considerations for Detection of Concealed ^{238}U

Pruet, J.; McNabb, D. P.; Feb. 16, 2006; 9 pp.; In English

Report No.(s): DE2006-893990; UCRL-TR-219071; No Copyright; Avail.: Department of Energy Information Bridge

Here they outline considerations that might inform choices for the design of a laser/linac-based light source used to detect (sup ^{238}U) via excitation of the resonance at 680.11 keV in this isotope. They assume that the principal concern is speed of interrogation and not, e.g., how much radiological dose is imparted during a scan. It is found that if the photon detectors used in the system have an energy resolution better than or comparable to that of the interrogation beam, then to a first approximation the light source should be designed to have the highest possible specific fluence (photons per unit energy per unit time). There is also a weak dependence of scan time on the number of photons emitted per pulse of the light source. A simple formula describing the tradeoff between specific fluence and number of photons per pulse is presented.

NTIS

Photons; Detectors; Laser Outputs

20070011592 Stanford Univ., Stanford, CA USA, Stanford Linear Accelerator Center, CA, USA

Study of Charm Baryons with the BaBar Experiment

Petersen, B. A.; Oct. 2006; 8 pp.; In English

Report No.(s): DE2006-894141; SLAC-PUB-12163; No Copyright; Avail.: National Technical Information Service (NTIS)

The authors report on several studies of charm baryon production and decays by the BABAR collaboration. They confirm previous observations of the $(\Xi)(\text{sub } c)(\text{sup } 0/+)$, $(\Xi)(\text{sub } c)(2980)(\text{sup } +)$ and $(\Xi)(\text{sub } c)(3077)(\text{sup } +)$ baryons, measure branching ratios for Cabibbo-suppressed $(\Lambda)(\text{sub } c)(\text{sup } +)$ decays and use baryon decays to study the properties of the light-quark baryons, $(\Omega)(\text{sup } -)$ and $(\Xi)(1690)(\text{sup } 0)$.

NTIS

Baryons; Charm (Particle Physics)

20070011593 European Organization for Nuclear Research, Geneva, Switzerland, Saclay Research Centre, Gif-sur-Yvette, France, DIAMOND, Oxfordshire, UK, European Synchrotron Radiation Facility, Grenoble, France

Accelerator Physics Code Web Repository

Zimmermann, F.; Basset, R.; Bellodi, G.; Benedetto, E.; Dorda, U.; January 2006; 3 pp.; In English

Report No.(s): DE2006-894159; CERN-LHC-PROJECT-REPORT-943; No Copyright; Avail.: National Technical Information Service (NTIS)

In the framework of the CARE HHH European Network, we have developed a web-based dynamic accelerator-physics code repository. We describe the design, structure and contents of this repository, illustrate its usage, and discuss our future plans, with emphasis on code benchmarking.

NTIS

Accelerators; World Wide Web; Computer Programs

20070011667 Lawrence Livermore National Lab., Livermore, CA USA

One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group

Lefrancois, A.; Roeske, F.; Tran, T.; Lee, R. S.; Feb. 15, 2006; 9 pp.; In English

Report No.(s): DE2006-893994; UCRL-TR-219022; No Copyright; Avail.: Department of Energy Information Bridge

The one year stay was possible after a long administrative process, because of the fact that this was the first participating guest of B division as a foreign national in HEAF (High Explosives Application Facility) with the Detonator/Detonation Physics Group.

NTIS

Detonation; Detonators

20070011670 Lawrence Livermore National Lab., Livermore, CA USA

QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions

Beiersdorfer, P.; Feb. 01, 2006; 6 pp.; In English

Report No.(s): DE2006-893999; UCRL-TR-218598; No Copyright; Avail.: Department of Energy Information Bridge

Atomic physics of high-Z, heavy ions is very different from that encountered in low-Z or medium-Z ions. The reason is the ultra strong nuclear field found only in the heaviest ions. The highest-Z atomic systems available to physical investigation,

the actinides, therefore, offer rich new physics that cannot be studied any other way. This ranges from new dominating forces in electron-ion collisions to tests of fundamental theories. A measurement of the two-loop Lamb shift in uranium is by many considered to be the 'holy grail' of high-field QED tests of atomic systems. Such measurements have been attempted at heavy-ion accelerator facilities but have yet to succeed because of the difficulty to make measurements with the required accuracy. Also, electron collisions behave very differently in such tightly bound systems. The magnetic interaction between the ion and the incoming free electron (the so-called generalized Breit interaction) is essentially non-existent in collisions involving low and medium-Z ions. This interaction is therefore missing in essentially all electron collision codes. But in heavy, highly charged ions like uranium, the generalized Breit interaction readily is the dominant force, changing electron collision cross sections by a factor of two. This has never been experimentally observed. In fact, no K-shell emission spectrum of any heavy high-Z ion higher than krypton ($Z=36$) has ever been recorded from a collisional source. By studying the heaviest actinides such fundamental science can be extended to regimes where the highest precision tests can be made.

NTIS

Actinide Series; Electron Scattering; Heavy Ions; Ions; Quantum Electrodynamics

20070012566 Lawrence Livermore National Lab., Livermore, CA USA

Physics Analysis of a Gas Attenuator with Argon as a Working Gas

Ryutov, D. D.; Bionta, R. M.; McKernan, M. A.; Shen, S.; Trent, J. W.; Dec. 19, 2005; 15 pp.; In English

Report No.(s): DE2006-890613; UCRL-TR-217793; No Copyright; Avail.: Department of Energy Information Bridge

A gas attenuator is an important element of the LCLS facility. The attenuator has to operate in a broad range of x-ray energies, provide attenuation coefficient between 1 and $10(\sup 4)$ with the accuracy of 1% and, at the same time, be reliable and allow for many months of un-interrupted operation. A detailed design study of the attenuator based on the use of nitrogen as a working gas has been recently carried out by S. Shen et al (1). In this note we assess the features of the attenuator based on the use of argon. We concentrate on the physics issues; the design features will probably be not that different from the aforementioned nitrogen attenuator. Although specific results obtained in our note pertain to argon, the general framework (and many equations obtained) are applicable also to the nitrogen attenuator. In the past, an analysis of the attenuator based on the use of a noble gas has already been carried out (2). This analysis was performed for an extremely stringent set of specifications. In particular, a very large diameter for the unobstructed x-ray beam was set (1 cm) to accommodate the spontaneous radiation; the attenuator was supposed to cover the whole range of energies of the coherent radiation, from 800 eV to 8000 eV; the maximum attenuation was set at the level of $10(\sup 4)$; the use of solid attenuators was not allowed, as well as the use of rotating shutters. The need to reach a sufficient absorption at the high-energy end of the spectrum predetermined the choice of Xe as the working gas (in order to have a reasonable absorption at a not-too-high pressure). A sophisticated differential pumping system that included a Penning-type ion pump was suggested in order to minimize the gas leak into the undulator/accelerator part of the facility. A high cost of xenon meant also that an efficient (and expensive) gas-recovery system would have to be installed. The main parameter that determined the high cost and the complexity of the system was a large radius of the orifice. The present viewpoint allows for much smaller size of the orifice, $a=1.5$ mm. The use of solid attenuators is also allowed for a higher-energy end of the spectrum. It is, therefore, worthwhile to reconsider various parameters of the gas attenuator for these much less stringent conditions. As a working gas we consider now the argon, which, on the one hand, provides reasonable absorption lengths and, on the other hand, is inexpensive enough to be exhausted into the atmosphere (no need for recovery). We concentrate on the processes in the main attenuation cell and just outside it, not touching upon a performance of the differential pumping system.

NTIS

Argon; Attenuators

20070012577 Old Dominion Univ., Norfolk, VA, USA

High Energy Effective Action from Scattering of QCD Shock Waves

Balitsky, I.; Aug. 01, 2006; 7 pp.; In English

Contract(s)/Grant(s): DOE/ER/40150-4015

Report No.(s): DE2006-890549; JLAB-THY-06-530; No Copyright; Avail.: National Technical Information Service (NTIS)

At high energies, the relevant degrees of freedom are Wilson lines--infinite gauge links ordered along straight lines collinear to the velocities of colliding particles. The effective action for these Wilson lines is determined by the scattering of QCD shock waves. I develop the symmetric expansion of the effective action in powers of strength of one of the shock waves and calculate the leading term of the series. The corresponding first-order effective action, symmetric with respect to projectile and target, includes both up and down fan diagrams and pomeron loops.

NTIS

Quantum Chromodynamics; Scattering; Shock Waves; Wave Scattering

20070012621 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA, Yale Univ., New Haven, CT, USA, Carnegie-Mellon Univ., Pittsburgh, PA, USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Light Baryon Spectrum using Improved Interpolating Operators

Basak, S.; Edwards, R. G.; Fleming, G. T.; Juge, J.; Lichti, A.; Jul. 2006; 7 pp.; In English

Report No.(s): DE2006-894637; No Copyright; Avail.: Department of Energy Information Bridge

Energies for excited light baryons are computed in quenched QCD with a pion mass of 490 MeV. Operators used in the simulations include local operators and the simplest nonlocal operators that have nontrivial orbital structures. All operators are designed with the use of Clebsch-Gordan coefficients of the octahedral group so that they transform irreducibly under the group rotations. Matrices of correlation functions are computed for each irreducible representation, and then the variational method is applied to separate mass eigenstates. We obtained 17 states for isospin 1/2 and 11 states for isospin 3/2 in various spin-parity channels including $J(\text{sup } P)=5/2(\text{sup } (+-))$. The pattern of the lowest-lying energies from each irrep is discussed. We use anisotropic lattices of volume $24(\text{sup } 3) \times 64$ with temporal lattice spacing $a(\text{sub } t)(\text{sup } -1)=6.05$ GeV with renormalized anisotropy $\xi=3.0$.

NTIS

Baryons; Interpolation; Spectra

20070012628 Brookhaven National Lab., Upton, NY, USA

Thermodynamics of (2+1)-Flavor QCD

Schmidt, C.; Umeda, T.; Oct. 2006; 6 pp.; In English

Report No.(s): DE2006-894619; BNL-77160-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

We report on the status of our QCD thermodynamics project. It is performed on the QCDOC machine at Brookhaven National Laboratory and the APEnext machine at Bielefeld University. Using a 2+1 flavor formulation of QCD at almost realistic quark masses we calculated several thermodynamical quantities. In this proceeding we show the susceptibilities of the chiral condensate and the Polyakov loop, the static quark potential and the spatial string tension.

NTIS

Quantum Chromodynamics; Thermodynamics

20070012719 Arizona Univ., Tucson, AZ, USA, Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA, Yale Univ., New Haven, CT, USA, Massachusetts Inst. of Tech., Cambridge, MA, USA

Calculation of the nucleon axial charge in lattice QCD

McGuckin, T.; January 2006; 5 pp.; In English

Report No.(s): DE2006-894668; No Copyright; Avail.: Department of Energy Information Bridge

Protons and neutrons have a rich structure in terms of their constituents, the quarks and gluons. Understanding this structure requires solving Quantum Chromodynamics (QCD). However QCD is extremely complicated, so we must numerically solve the equations of QCD using a method known as lattice QCD. Here we describe a typical lattice QCD calculation by examining our recent computation of the nucleon axial charge.

NTIS

Nucleons; Quantum Chromodynamics; Field Theory (Physics)

20070012720 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA

Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea

Edwards, R. G.; Fleming, G.; Negele, J. W.; Orginos, K.; Pochinsky, A. V.; Jul. 2006; 13 pp.; In English

Report No.(s): DE2006-894645; No Copyright; Avail.: Department of Energy Information Bridge

Moments of unpolarized, helicity, and transversity distributions, electromagnetic form factors, and generalized form factors of the nucleon are presented from a preliminary analysis of lattice results using pion masses down to 359 MeV. The twist two matrix elements are calculated using a mixed action of domain wall valence quarks and asqtad staggered sea quarks and are renormalized perturbatively. Several observables are extrapolated to the physical limit using chiral perturbation theory. Results are compared with experimental moments of quark distributions and electromagnetic form factors and phenomenologically determined generalized form factors, and the implications on the transverse structure and spin content of the nucleon are discussed.

NTIS

Chirality; Domain Wall; Fermions; Nucleons

20070012721 Lawrence Livermore National Lab., Livermore, CA USA

Ultra-High Gradient Dielectric Wakefield Accelerator Experiments

Thompson, M. C.; Badakov, H.; Rosenzweig, J. B.; Travish, G.; Aug. 2006; 9 pp.; In English

Report No.(s): DE2006-894768; UCRL-CONF-223510; No Copyright; Avail.: National Technical Information Service (NTIS)

Ultra-high gradient dielectric wakefield accelerators are a potential option for a linear collider afterburner since they are immune to the ion collapse and electron/positron asymmetry problems implicit in a plasma based afterburner. The first phase of an experiment to study the performance of dielectric Cerenkov wakefield accelerating structures at extremely high gradients in the GV/m range has been completed. The experiment took advantage of the unique SLAC FFTB electron beam and its ultra-short pulse lengths and high currents (e.g., $(\sigma_z) = 20$ (micro)m at $Q = 3$ nC). The FFTB electron beam was successfully focused down and sent through short lengths of fused silica capillary tubing (ID = 200 (micro)m/OD = 325 (micro)m). The pulse length of the electron beam was varied to produce a range of electric fields between 2 and 20 GV/m at the inner surface of the dielectric tubes. We observed a sharp increase in optical emissions from the capillaries in the middle part of this surface field range which we believe indicates the transition between sustainable field levels and breakdown. If this initial interpretation is correct, the surfaced fields that were sustained equate to on axis accelerating field of several GV/m. In future experiments being developed for the SLAC SABER and BNL ATF we plan to use the coherent Cerenkov radiation emitted from the capillary tube as a field strength diagnostic and demonstrate GV/m range particle energy gain.

NTIS

Dielectrics; Gradients; Accelerators; Electron Beams

20070012722 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA

Exotic and Higher Spin Mesons in Charmonium

Dudek, J.; Edwards, R. G.; Mathur, N.; Richards, D.; Jul. 2006; 7 pp.; In English

Report No.(s): DE2006-894647; No Copyright; Avail.: Department of Energy Information Bridge

Exotic and higher spin (χ 1) mesons are still not thoroughly investigated in lattice QCD. Using a set of derivative based operators we report our exploratory study of these mesons in charmonium region. We use a $12(\text{sup } 3) \times 48$ anisotropic ($\xi = 3$) clover lattice with inverse temporal lattice spacing $a(\text{sup } -1) = 6.05$ GeV. Techniques developed in this exploratory study will be utilized in our future comprehensive study of light hybrid mesons that are to be explored in the 12 GeV GlueX experiment at Jefferson Laboratory.

NTIS

Charm (Particle Physics); Mesons; Spin

20070012723 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Advantages of the Program-Based Logbook Submission GUI at Jefferson Lab

McGuckin, T.; January 2006; 3 pp.; In English

Report No.(s): DE2006-894666; No Copyright; Avail.: Department of Energy Information Bridge

DTLite is a Tcl/Tk script that is used as the primary interface for making entries into Jefferson Lab's electronic logbooks. DTLite was originally written and implemented by a user to simplify submission of entries into Jefferson Lab's electronic logbook, but has subsequently been maintained and developed by the controls software group. The use of a separate, script-based tool for logbook submissions (as opposed to a web-based submission tool bundled with the logbook database/interface) provides many advantages to the users, as well as creating many challenges to the programmers and maintainers of the electronic logbook system. The paper describes the advantages and challenges of this design model and how they have affected the development lifecycle of the electronic logbook system.

NTIS

Graphical User Interface; Accelerators; Computer Programs; Electronic Equipment

20070012724 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA

Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks

Lin, H. W.; Ohta, S.; Jul. 2006; 7 pp.; In English

Report No.(s): DE2006-894646; No Copyright; Avail.: Department of Energy Information Bridge

We report RBC and RBC/UKQCD lattice QCD numerical calculations of nucleon electroweak matrix elements with dynamical domain-wall fermions (DWF) quarks. The first, RBC, set of dynamical DWF ensembles employs two degenerate flavors of DWF quarks and the DBW2 gauge action. Three sea quark mass values of 0.04, 0.03 and 0.02 in lattice units are

used with about 200 gauge configurations each. The lattice cutoff is about 1.7 GeV and the spatial volume is about $(1.9 \text{ fm})^3$. Despite the small volume, the ratio of the isovector vector and axial charges $g(\text{sub A})/g(\text{sub V})$ and that of structure function moments $\langle \text{sub u-d} \rangle / \langle \text{sub } (\Delta) \text{ u} - (\Delta) \text{ d} \rangle$ are in agreement with experiment, and show only very mild quark mass dependence. The second, RBC/UK, set of ensembles employs one strange and two degenerate (up and down) dynamical DWF quarks and Iwasaki gauge action. The strange quark mass is set at 0.04, and three up/down mass values of 0.03, 0.02 and 0.01 in lattice units are used. The lattice cutoff is about 1.6 GeV and the spatial volume is about $(3.0 \text{ fm})^3$. Even with preliminary statistics of 25-30 gauge configurations, the ratios $g(\text{sub A})/g(\text{sub V})$ and $\langle \text{sub u-d} \rangle / \langle \text{sub } (\Delta) \text{ u} - (\Delta) \text{ d} \rangle$ are consistent with experiment and show only very mild quark mass dependence. Another structure function moment, $d(\text{sub 1})$, though yet to be renormalized, appears small in both sets.

NTIS

Domain Wall; Fermions; Nucleons; Quantum Chromodynamics; Quarks; Electroweak Interactions (Field Theory)

20070012742 Rensselaer Polytechnic Inst., Troy, NY, USA, Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Search for Pentaquarks with CLAS

Kubarovsky, V.; Stoler, P.; January 2006; 5 pp.; In English

Report No.(s): DE2006-895607; No Copyright; Avail.: Department of Energy Information Bridge

We review the latest results from experiments dedicated to pentaquark searches carried out at the Jefferson Lab with the CLAS detector.

NTIS

Quarks; Flavor (Particle Physics)

20070012744 Connecticut Univ., Storrs, CT, USA

Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS

Ungaro, M.; Joo, K.; Nov. 01, 2006; 3 pp.; In English

Contract(s)/Grant(s): AC05-84ER40150

Report No.(s): DE2006-895608; JLAB-PHY-06-547; No Copyright; Avail.: Department of Energy Information Bridge

Single pion electroproduction in the resonance region has been studied as a means of exploring the physics underlying the structure of the nucleon. Recent experiments using CLAS at Jefferson Lab/Hall B have measured unpolarized cross sections and beam spin asymmetries over a large kinematic range. The high statistical accuracy of this data set provides important information on the $\Delta(1232)$ and the Roper.

NTIS

Nucleons; Pions; Particle Production

20070012791 Missouri Univ., Columbia, MO USA

A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint)

Yeckel, C; Curry, R D; Norgard, P; Apr 2006; 6 pp.; In English

Contract(s)/Grant(s): F33615-01-C-2191; Proj-3145

Report No.(s): AD-A460832; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA460832>

The breakdown performance of an advanced synthetic dielectric coolant, poly-alpha olefin, is compared to conventional transformer oil over a range of temperatures from 10 to 50 deg. C. The poly-olefin oil is first benchmarked against conventional transformer oil, and then compared to poly-olefin oil that has been exposed to a large number of high-energy discharges in order to establish the effects of oil age on performance. The results obtained from the standard ANSI D877 testing procedure are then compared to the results of a modified test procedure.

DTIC

Alkenes; Alternating Current; Coolants; Dielectrics; Oils; Transformers

20070012847 Air Force Research Lab., Wright-Patterson AFB, OH USA

Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions

Kahandawala, Moshan S; Corera, Shehan A; Williams, Skip; Carter, Campbell D; Sidhul, Sukh S; Oct 2005; 10 pp.; In English

Contract(s)/Grant(s): Proj-2308

Report No.(s): AD-A462973; AFRL-PR-WP-TP-2006-253; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462973>

A single pulse reflected shock tube was used to investigate iso-octane ignition over the temperature range of 900-1400 K at a pressure of 1 atm. To account for the anticipated long ignition delay times at the lower temperatures, long shock tube dwell times (12 ms) at lower temperature and near atmospheric pressure were achieved by using argon-helium mix as a driver gas. Chemical thermometer experiments were conducted to remove any uncertainties in determining post-reflected shock temperatures. The ignition delay data obtained in this study are in good agreement (in the overlap region) with the iso-octane ignition data from a previous shock tube study. However, the activation energy of iso-octane ignition obtained in this study in the lower temperature region (1300 K) is significantly smaller (15 kcal vs. 40 kcal) than that obtained in a previous higher temperature study. The deflagration may be responsible for lowering of activation energy under the conditions of this study. Two detailed iso-octane kinetic models were used to model the experimental results of this study.

DTIC

Ignition; Kinetics; Supersonic Combustion Ramjet Engines

20070013152 Air Force Research Lab., Wright-Patterson AFB, OH USA

Role of Delocalized Charges in the Pyroelectric Effect

Evans, D R; Basun, S A; Cook, G; Meltzer, R S; Jan 2006; 6 pp.; In English

Contract(s)/Grant(s): Proj-4348

Report No.(s): AD-A462974; AFRL-ML-WP-TP-2006-469; No Copyright; Avail.: CASI: [A02](#), Hardcopy

We show the temperature dependence of the pyroelectric effect and demonstrate how an increase in dark conductivity as a result of either trap depopulation or proton migration suppresses the pyroelectric-generated high voltage. Electrically shorting crystal z-surfaces coated with a transparent conductive layer is shown to be an effective way of eliminating the breakdown of the surface charge in air. A new method of measuring proton migration temperatures and nonradiative transitions is proposed.

DTIC

Electric Charge; Migration; Protons; Pyroelectricity

20070013246 Nevada Univ., Reno, NV USA

Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications

Craviso, Gale L; Chatterjee, Indira; Nov 30, 2006; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-1-0262

Report No.(s): AD-A463444; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The research goal was to undertake a study to define radiofrequency/microwave (RF/MW) exposure parameters that produce non-thermal effects both on catecholamine release, using cultured adrenal chromaffin cells as an *in vitro* model system, and on skeletal muscle contraction, using intact skeletal muscle Strips. Major accomplishments included 1) implementation of experiments following completion of the design, characterization and construction both of a waveguide-based exposure system (0.75-1 GHz frequency range) and a free space exposure system (1-6 GRz frequency range) for on-line monitoring of catecholamine release during exposure of chromaffin cells to RF/MW fields; 2) implementation of experiments following completion of the design, characterization and construction of a waveguide-based exposure system for monitoring skeletal muscle contraction during exposure to 0.75-1 GHz RF fields, and 3) preliminary data showing apparent non-thermal effects on both biological endpoints. The research, which had been transitioned into FA9550-04-1-0194 and FA9550-05-1-0308, has been presented at several international meetings and has culminated in three peer-reviewed published papers and one Master's thesis. Personnel involved in the project included a neurobiologist and an electrical engineer as principal investigators an associate engineer research assistants and graduate students.

DTIC

Biological Effects; Microwaves; Military Technology; Radio Frequencies

20070013289 Air Force Research Lab., Wright-Patterson AFB, OH USA

Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD)

Estevadeordal, Jordi; Gogineni, Sivaram; Dec 2006; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-A04R

Report No.(s): AD-A463519; AFRL-VA-WP-TR-2006-3211; No Copyright; Avail.: CASI: [A03](#), Hardcopy

DBDs were created in a quiescent environment, and particle image velocimetry (PIV) was used to obtain field measurements of velocity induced by the discharge. These PIV measurements included random phase measurements and measurements phase-locked to the DBD driving frequency. Instantaneous and average velocity distributions were used for

flow analysis. In addition, the effects of buoyancy and large-scale background air movement around the test device were also evaluated and efforts to eliminate or minimize spurious results arising from either effect were made.

DTIC

Dielectrics; Electric Discharges; Low Speed; Particle Image Velocimetry

20070013468 Lawrence Livermore National Lab., Livermore, CA USA

Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification

Logan, R. W.; Nitta, C. K.; Chidester, S. K.; Mar. 2006; 13 pp.; In English

Report No.(s): DE2006-894762; UCRL-TR-219879; No Copyright; Avail.: Department of Energy Information Bridge

One of the final steps in building a numerical model of a physical, mechanical, thermal, or chemical process, is to assess its accuracy as well as its sensitivity to input parameters and modeling technique. In this work, we demonstrate one simple process to take a top-down or integral view of the model, one which can implicitly reflect any couplings between parameters, to assess the importance of each aspect of modeling technique. We illustrate with an example of a comparison of a finite element model with data for violent reaction of explosives in accident scenarios. We show the relative importance of each of the main parametric inputs, and the contributions of model form and grid convergence. These can be directly related to the importance factors for the system being analyzed as a whole, and help determine which factors need more attention in future analyses and tests.

NTIS

Estimating; Integrals; Mathematical Models; Numerical Analysis

20070013469 Lawrence Livermore National Lab., Livermore, CA USA

Development of the Butt Joint for the ITER Central Solenoid

Martovetsky, N. N.; Aug. 2006; 6 pp.; In English

Report No.(s): DE2006-894763; UCRL-CONF-223959; No Copyright; Avail.: Department of Energy Information Bridge

The ITER Central Solenoid (CS) requires compact and reliable joints for its Cable-in-Conduit Conductor (CICC). The baseline design is a diffusion bonded butt joint. In such a joint the mating cables are compacted to a very low void fraction in a copper sleeve and then heat treated. After the heat treatment the ends are cut, polished and aligned against each other and then diffusion bonded under high compression in a vacuum chamber at 750 degrees C. The jacket is then welded on the conductor to complete the joint, which remarkably does not require more room than a regular conductor. This joint design is based on a proven concept developed for the ITER CS Model Coil that was successfully tested in the previous R&D phase.

NTIS

Butt Joints; Fusion Reactors; Solenoids; Superconductivity; Thermonuclear Reactions

20070013471 Lawrence Livermore National Lab., Livermore, CA USA

UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis

Thompson, M. C.; Badakov, H.; Rosenzweig, J. B.; Travish, G.; Filler, R.; Aug. 2006; 9 pp.; In English

Report No.(s): DE2006-894760; UCRL-CONF-223506; No Copyright; Avail.: National Technical Information Service (NTIS)

Focusing of a 15 MeV, 16 nC electron bunch by a gaussian underdense plasma lens operated just beyond the threshold of the underdense condition has been demonstrated. The strong 1.9 cm focal length plasma lens focused both transverse directions simultaneously and reduced the minimum area of the beam spot by a factor of 23. Analysis of the beam envelope evolution observed near the beam waist shows that the spherical aberrations of this underdense lens are lower than those of an overdense plasma lens, as predicted by theory. Time resolved measurements of the focused electron bunch are also reported and compared to simulations.

NTIS

Lenses; Plasmas (Physics); Electron Bunching; Electromagnetism

20070013472 Lawrence Livermore National Lab., Livermore, CA USA

EUV Testing of Multilayer Mirrors: Critical Issues

Hill, S. B.; Ermanoski, I.; Grantham, S.; Tarrío, C.; Lucatorto, T. B.; Feb. 2006; 11 pp.; In English

Report No.(s): DE2006-894751; UCRL-PROC-219279; No Copyright; Avail.: Department of Energy Information Bridge

Recently, while performing extensive EUV irradiation endurance testing on Ru-capped multilayer mirrors in the presence of elevated partial pressures of water and hydrocarbons, NIST has observed that the amount of EUV-induced damage actually

decreases with increasing levels of water vapor above (approx.) 5×10^{-7} Torr. It is thought that the admitted water vapor may interact with otherwise stable, condensed carbonaceous species in an UHV vacuum system to increase the background levels of simple gaseous carbon-containing molecules. Some support for this hypothesis was demonstrated by observing the mitigating effect of very small levels of simple hydrocarbons with the intentional introduction of methyl alcohol in addition to the water vapor. It was found that the damage rate decreased by at least an order of magnitude when the partial pressure of methyl alcohol was just one percent of the water partial pressure. These observations indicate that the hydrocarbon components of the vacuum environment under actual testing conditions must be characterized and controlled to 10^{-11} Torr or better in order to quantify the damage caused by high levels of water vapor. The possible effects of exposure beam size and out-of-band radiation on mirror lifetime testing will also be discussed.

NTIS

Extreme Ultraviolet Radiation; Lithography; Mirrors; Irradiation

20070013473 Lawrence Livermore National Lab., Livermore, CA USA

From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei

Barrett, B. R.; Stetcu, I.; Navratil, P.; Vary, J. P.; Mar. 2006; 14 pp.; In English

Report No.(s): DE2006-894756; UCRL-PROC-219600; No Copyright; Avail.: National Technical Information Service (NTIS)

No-core shell model (NCSM) calculations using ab initio effective interactions are very successful in reproducing experimental nuclear spectra. The main theoretical approach is the use of effective operators, which include correlations left out by the truncation of the model space to a numerically tractable size. We review recent applications of the effective operator approach, within a NCSM framework, to the renormalization of the nucleon-nucleon interaction, as well as scalar and tensor operators.

NTIS

Mathematical Models; Nuclei (Nuclear Physics); Nucleon-Nucleon Interactions; Operators (Mathematics)

20070013474 Barcelona Univ., Spain

Observation of a Broad Structure at an Invariant Mass of 4.32 GeV in the Reaction $e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$ Measured at BaBar

Aubert, B.; Barate, R.; Oct. 2006; 7 pp.; In English

Report No.(s): DE2006-894565; BABAR-PUB-06/038; SLAC-PUB-12155; No Copyright; Avail.: National Technical Information Service (NTIS)

The authors measure the cross section for the process $e^+e^- \rightarrow \pi^+\pi^-\psi(2S)$ from threshold up to 8 GeV center-of-mass energy using events containing initial-state radiation, produced at the PEP-II e^+e^- storage rings. The study is based on 298 fb⁻¹ of data recorded with the BABAR detector. A structure is observed in the cross-section not far above threshold, near 4.32 GeV. This structure is not compatible with the Y(4260) previously reported by this experiment. A single resonance is adequate to describe the cross-section in the low-energy region ($\sqrt{s} < 5.7$ GeV).

NTIS

High Energy Interactions; Mesons

20070013477 Brookhaven National Lab., Upton, NY, USA

QCD Thermodynamics with $N_f=2+1$ Near the Continuum Limit at Realistic Quark Masses

Umeda, T.; Oct. 2006; 9 pp.; In English

Report No.(s): DE2006-894612; BNL-77104-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

We report on our study of QCD thermodynamics with 2 + 1 flavors of dynamical quarks. In this proceeding we present several thermodynamic quantities and our recent calculation of the critical temperature. In order to investigate the thermodynamic properties of QCD near the continuum limit we adopt improved staggered (p4) quarks coupled with tree-level Symanzik improved glue on $N_t = 4$ and 6 lattices. The simulations are performed with a physical value of the strange quark mass and light quark masses which are in the range of $m_q/m_s = 0.05 - 0.4$. The lightest quark mass corresponds to a pion mass of about 150 MeV.

NTIS

Continuums; Quantum Chromodynamics; Quarks; Thermodynamics

20070013478 Sandia National Labs., Albuquerque, NM USA

Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System

Mazarakis, M. G.; Struve, K. W.; Sep. 2006; 24 pp.; In English

Report No.(s): DE2006-894744; SAND-2006-5811; No Copyright; Avail.: Department of Energy Information Bridge

The purpose of this work was to develop a conceptual design for the Saturn accelerator using the modular Liner-Transformer Driver (LTD) technology to identify risks and to focus development and research for this new technology. We present a reference design for a Saturn class driver based on a number of linear inductive voltage adders connected in parallel. This design is very similar to a design reported five years ago. However, with the design reported here we use 1-MA, 100-kV LTD cavities as building blocks. These cavities have already been built and are currently in operation at the HCEI in Tomsk, Russia. Therefore, this new design integrates already-proven individual components into a full system design.

NTIS

Transformers; Systems Engineering; Linearity

20070013481 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA

Precision Measurement of the Charged Pion Form and Factor

Horn, T.; January 2006; 3 pp.; In English

Report No.(s): DE2006-895605; No Copyright; Avail.: Department of Energy Information Bridge

Hadronic form factors are objects that contribute significantly to our understanding of the structure of matter. The simplest hadronic system is the pion, whose electromagnetic structure is given by a single form factor (F). In this talk the results from the most recent Fpi at Jefferson Lab are presented.

NTIS

Form Factors; Hadrons; Photoproduction; Pions; Precision

20070013484 Pacific Northwest National Lab., Richland, WA, USA

Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices

Milbrath, B. D.; Choate, B. J.; Fast, J. E.; Hensley, W. K.; Kouzes, R. T.; Apr. 2005; 26 pp.; In English

Report No.(s): DE2006-894484; PNNL-15832; PIET-43741-TM-488; No Copyright; Avail.: National Technical Information Service (NTIS)

Lanthanum halide (LaBr₃:Ce) scintillators offer significantly better resolution (3 percent at 662 kilo-electron volt (keV)) relative to sodium iodide (NaI(Tl)) and have recently become commercially available in sizes large enough for the hand-held radio-isotope identification device (RIID) market. There are drawbacks to lanthanum halide detectors, however. These include internal radioactivity that contributes to spectral counts and a low-energy response that can cause detector resolution to be lower than that of NaI(Tl) below 100 keV. To study the potential of this new material for RIIDs, we performed a series of measurements comparing a 1.5-1.5 inch LaBr₃:Ce detector with an Exploranium GR 135 RIID, which contains a 1.5-2.2 inch NaI(Tl) detector. Measurements were taken for short time frames, as typifies RIID usage. Measurements included examples of naturally occurring radioactive material (NORM), typically found in cargo, and special nuclear materials. Some measurements were noncontact, involving short distances or cargo shielding scenarios. To facilitate direct comparison, spectra from the different detectors were analyzed with the same isotope identification software (ORTEC ScintiVision TM).

NTIS

Bromides; Isotopes; Lanthanum; Scintillation Counters

20070013494 Massachusetts Inst. of Tech., Cambridge, MA, USA, Yale Univ., New Haven, CT, USA, Vrije Univ., Amsterdam, Netherlands, Arizona Univ., Tucson, AZ, USA

Hadron Structure from Lattice QCD

Rickhards, D.; Edwards, R.; Feb. 01, 2006; 6 pp.; In English

Contract(s)/Grant(s): AC05-84ER40150

Report No.(s): DE2006-892153; JLAB-THY-05-462; DOE/ER/40150-405,HEP-LAT/0509101; No Copyright; Avail.:

Department of Energy Information Bridge

The structure of neutrons, protons, and other strongly interacting particles is now being calculated in full, unquenched lattice QCD with quark masses entering the chiral regime. This talk describes selected examples, including the nucleon axial

charge, structure functions, electromagnetic form factors, the origin of the nucleon spin, the transverse structure of the nucleon, and the nucleon to Delta transition form factor.

NTIS

Hadrons; Quantum Chromodynamics

20070013496 Ljubljana Univ., Ljubljana, Slovenia, Old Dominion Univ., Norfolk, VA, USA

Inclusive and Exclusive Compton Processes in Quantum Chromodynamics

Psaker, A.; Dec. 31, 2005; 159 pp.; In English

Contract(s)/Grant(s): AC05-84ER40150

Report No.(s): DE2006-892144; JLAB-THY-05-463; HEP-PH/0511283,DOE/ER/40150-4050; No Copyright; Avail.:

Department of Energy Information Bridge

In our work, we describe two types of Compton processes. As an example of an inclusive process, we consider the high-energy photoproduction of massive muon pairs off the nucleon. We analyze the process in the framework of the QCD parton model, in which the usual parton distributions emerge as a tool to describe the nucleon in terms of quark and gluonic degrees of freedom. To study its exclusive version, a new class of phenomenological functions is required, namely, generalized parton distributions. They can be considered as a generalization of the usual parton distributions measured in deeply inelastic lepton-nucleon scattering. Generalized parton distributions (GPDs) may be observed in hard exclusive reactions such as deeply virtual Compton scattering. We develop an extension of this particular process into the weak interaction sector. We also investigate a possible application of the GPD formalism to wide-angle real Compton scattering.

NTIS

Quantum Chromodynamics; Compton Effect

20070013499 Brookhaven National Lab., Upton, NY USA

Directional Detection of a Neutron Source

Vanier, P. E.; Forman, L.; January 2006; 11 pp.; In English

Report No.(s): DE2006-891292; BNL-76972-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Advantages afforded by the development of new directional neutron detectors and imagers are discussed. Thermal neutrons have mean free paths in air of about 20 meters, and can be effectively imaged using coded apertures. Fission spectrum neutrons have ranges greater than 100 meters, and carry enough energy to scatter at least twice in multilayer detectors which can yield both directional and spectral information. Such strategies allow better discrimination between a localized spontaneous fission source and the low, but fluctuating, level of background neutrons generated by cosmic rays. A coded aperture thermal neutron imager will be discussed as well as a proton-recoil double-scatter fast-neutron directional detector with time-of-flight energy discrimination.

NTIS

Neutron Counters; Neutron Sources; Neutrons

20070013566 Ward and Olivo, New York, NY, USA

Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir

Maulik, R. J.; 20 Apr 04; 25 pp.; In English

Contract(s)/Grant(s): AF-F33615-98-C-1212

Patent Info.: Filed Filed 20 Apr 04; US-Patent-Appl-SN-100-829-148

Report No.(s): PB2007-105954; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A liquid metal evaporation source for use in Molecular Beam Epitaxy and related metal vacuum deposition techniques. An evaporator is maintained at a high temperature to evaporate a liquid metal, a reservoir for holding the liquid metal source is maintained at a temperature above the melting point of the metal but below the temperature in the evaporator, and a hollow transport tube connecting the evaporator and reservoir is maintained at a temperature between these temperatures. The reservoir is in the shape of a hollow cylinder with a close-fitting cylindrical piston which is used to force the liquid metal through the hollow transport tube into the evaporator. The liquid metal will not flow past the piston seal if a suitably small gap is formed between the piston and the reservoir walls wherein the surface tension of the liquid metal will exceed its hydrostatic pressure against the piston thus forming a leak-tight seal.

NTIS

Evaporation; Liquid Metals; Patent Applications; Reservoirs

20070013602 Army Armament Research, Development and Engineering Center, Picatinny Arsenal, NJ USA
Transportation Vibration Analysis of the XM982 Projectile

Lee, J; Groeschler, S; Feb 2007; 23 pp.; In English; Original contains color illustrations
Report No.(s): AD-A463509; ARAET-TR-06024; No Copyright; Avail.: CASI: A03, Hardcopy

Vibration testing, simulating ground vehicle transportation was performed on the Excalibur and resulted in unexpected responses of the projectile. Modeling and simulation was used to replicate the vibration test and determine the merits of different mounting configurations to secure the round. The mounting configurations were compared based on levels of projectile rotation and torque.

DTIC

Dynamic Structural Analysis; Evaluation; Projectiles; System Effectiveness; Transportation; Vibration

71 ACOUSTICS

Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution*. For aircraft noise see also *02 Aerodynamics* and *07 Aircraft Propulsion and Power*.

20070011549 Swedish Defence Research Establishment, Linköping, Sweden
IAM Slutrapport 2005 (IAM Annual Report 2005)

Nov. 2005; 20 pp.; In Swedish
Report No.(s): PB2007-105503; FOI-R-1836-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

In the report, the results from the project IAM during 2005 are presented. The project, which is a one-year extension of an already ongoing project, has during 2005 presented the results from applying algorithms for classification of ground vehicles on acoustic data in a conference paper. Furthermore, the work with the improvements of the already implemented simulation model for sensor networks in the simulation framework MOSART has continued. Knowledge and experiences have been transferred to the FMV ground sensor demonstrator as implemented algorithms. Finally the report describes some scenarios from the urban terrain and how sensor networks could be used.

NTIS

Acoustic Properties; Algorithms; Classifications; Surface Vehicles

20070012405 NASA Glenn Research Center, Cleveland, OH, USA, ASRC Aerospace Corp., Cleveland, OH, USA
Progress Toward Improving Jet Noise Predictions in Hot Jets

Khavaran, Abbas; Kenzakowski, Donald C.; February 2007; 24 pp.; In English; 45th Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA

Contract(s)/Grant(s): NNC06BA07B; WBS 561581,92,98.03.18.03

Report No.(s): NASA/CR-2007-214671; E-15807; AIAA Paper 2007-0012; Copyright; Avail.: CASI: A03, Hardcopy

An acoustic analogy methodology for improving noise predictions in hot round jets is presented. Past approaches have often neglected the impact of temperature fluctuations on the predicted sound spectral density, which could be significant for heated jets, and this has yielded noticeable acoustic under-predictions in such cases. The governing acoustic equations adopted here are a set of linearized, inhomogeneous Euler equations. These equations are combined into a single third order linear wave operator when the base flow is considered as a locally parallel mean flow. The remaining second-order fluctuations are regarded as the equivalent sources of sound and are modeled. It is shown that the hot jet effect may be introduced primarily through a fluctuating velocity/enthalpy term. Modeling this additional source requires specialized inputs from a RANS-based flowfield simulation. The information is supplied using an extension to a baseline two equation turbulence model that predicts total enthalpy variance in addition to the standard parameters. Preliminary application of this model to a series of unheated and heated subsonic jets shows significant improvement in the acoustic predictions at the 90 degree observer angle.

Author

Jet Aircraft Noise; Noise Prediction; Acoustics; Computational Fluid Dynamics; Jet Flow

20070012897 Naval Surface Warfare Center, Bethesda, MD USA
Acoustic Design of Naval Structures

Nikiforov, S; Dec 2005; 206 pp.; In English

Report No.(s): AD-A463069; NSWCCD-70-TR-2005/149; No Copyright; Avail.: CASI: A10, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463069>

Under current practice, the means to fight noise and vibration on ship structures are applied on already finalized designs of ships. This is the more expensive solution to the problem. The most efficient design with less cost can be achieved if from the beginning of the design process, the acoustic silencing requirements are implemented. The author put forth for himself as the purpose of this book, a plan to systematize such an approach, gained through his research experience on the acoustic characteristics of vibration and radiation of ship structures, sources of the main contributors of vibrations and noise on ships, causes of their origins, and methods of mitigating those vibrations and noise. This book is intended for research scientists, engineering, and technical experts involved in the field concerned with the reduction of vibration and noise in ships and other means of transportation.

DTIC

Acoustic Properties; Acoustics; Dynamic Structural Analysis; Marine Technology; Noise Reduction

20070013141 Naval Postgraduate School, Monterey, CA USA

Design and Analysis of Side-Looking Sonar Experiments

Tsaprazis, Konstantinos; Dec 2006; 129 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462697; No Copyright; Avail.: CASI: [A07](#), Hardcopy

This research concerns the design and analysis of different Side-Looking Sonar experiments in order to satisfy different operational requirements. The different designs and analysis have been done via computer simulation. Side-Looking Sonar (also known as side-scan sonar) is known for very high quality, high resolution, ocean bottom imaging. Hence, it is used for bathymetric surveys commonly called seafloor mapping. It is able to rapidly survey large ocean areas for bottom and suspended sea-mines or other kinds of threats. Another operational aspect of these systems is that they allow autonomous underwater vehicles (AUVs) to conduct operations, mostly in shallow water and near land. Thus, Side-Looking Sonar can be a very useful device in littoral warfare operations. This research has defined the basic parameters that rule the operation of a Side-Looking Sonar and, furthermore, analyzed various aspects that affect the performance of these parameters. Special focus was given to the various operational requirements and conditions that a designer or a user may encounter in realistic situations. Towards that end, many numerical examples are presented. Moreover, this research has tried to indicate the various problems that may arise when a Side-Looking Sonar operates in its near-field region and suggests certain solutions. The active sonar equation and its factors were explained and were evaluated for a realistic example of mine detection as well.

DTIC

Autonomous Navigation; Design Analysis; Regions; Sonar; Underwater Vehicles

72

ATOMIC AND MOLECULAR PHYSICS

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see [73 Nuclear Physics](#).

20070012797 Naval Postgraduate School, Monterey, CA USA

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR

Malamas, Sitthichai; Dec 2006; 53 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462645; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462645>

The purpose of this thesis research was to explore the feasibility of spectral imaging using a microbolometer infrared camera and a step-scan Fourier transform infrared spectrometer (FTIR). Spectral imaging is usually carried out using cryogenically cooled semiconductor based focal plane arrays (FPAs) which provide higher sensitivity compared to microbolometer FPAs based on thermal sensors. The key advantage of spectral imaging is the ability to extract spatial variations of spectral information. During the measurement, images were collected as the moving mirror of the FTIR stepped across the zero crossings of the on-axis portion of the interferogram. The preliminary data indicate that interferograms can be successfully recorded using the microbolometer camera, and that data from individual pixels of the camera showed the expected intensity profile. The interferograms from the individual pixels were inverse Fourier transformed to recover the intensity of the broadband infrared source of the FTIR at different pixels. The initial data showed relatively low signal to noise

ratio indicating that signal averaging is necessary at each mirror step by collecting several images as well as optimizing the image collecting optics.

DTIC

Bolometers; Cameras; Focal Plane Devices; Fourier Transformation; Imaging Techniques; Infrared Radiation; Infrared Spectra; Infrared Spectrometers; Spectroscopy

20070012902 Air Force Research Lab., Hanscom AFB, MA USA

The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique

Dressler, Rainer A; Chiu, Y; Levandier, D J; Tang, X N; Hou, Y; Chang, C; Houchins, C; Xu, H; Ng, Cheuk-Yiu; Jan 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-2303

Report No.(s): AD-A463079; AFRL-VS-HA-TR-2007-1010; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463079>

This paper presents the methodology to generate beams of ions in single quantum states for bimolecular ion-molecule reaction dynamics studies using pulsed field ionization (PFI) of atoms or molecules in high- n Rydberg states produced by vacuum ultraviolet (VUV) synchrotron or laser photoexcitation. Employing the pseudocontinuum high-resolution VUV synchrotron radiation at the Advanced Light Source as the photoionization source, PFI photoions (PFI-PIs) in selected rovibrational states have been generated for ion-molecule reaction studies using a fast-ion gate to pass the PFI-PIs at a fixed delay with respect to the detection of the PFI photoelectrons (PFI-PEs). The fast ion gate provided by a novel interleaved comb wire gate lens is the key for achieving the optimal signal-to-noise ratio in state-selected ion-molecule collision studies using the VUV synchrotron based PFI-PE secondary ion coincidence (PFI-PESICO) method. The most recent development of the VUV laser PFI-PI scheme for state-selected ion-molecule collision studies is also described. Absolute integral cross sections for state-selected H^+ ions ranging from $v^+=0$ to 17 in collisions with Ar, Ne, and He at controlled translational energies have been obtained by employing the VUV synchrotron based PFI-PESICO scheme.

DTIC

Far Ultraviolet Radiation; Ionic Reactions; Ionization; Molecular Interactions; Photoionization

20070013325 Harvard Univ., Cambridge, MA USA

Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry

Khaneja, Navin; Aug 11, 2006; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0427

Report No.(s): AD-A463606; No Copyright; Avail.: CASI: [A01](#), Hardcopy

The main theme of the grant has been to study design of input probe signals for robust system identification. We have used these methods for design of pulse sequences in NMR spectroscopy that are robust to inhomogeneity and dispersion in the parameters of the system of interest. We have developed control theoretic methods which allow control of nuclear spins in presence of extreme inhomogeneities. We have shown that these new nonlinear control methods for probe design and system identification are an enabling technology for NMR and MRI in inhomogeneous fields, making mobile NMR and MRI systems practical. Such a system can serve multiple roles in a combat situation including diagnosis of head injury and trauma, detection of explosives and scanning metabolites in the living tissue.

DTIC

Detection; Imaging Techniques; Lasers; Magnetic Resonance; Nuclear Magnetic Resonance; Proteins; Spectroscopy

20070013658 Air War Coll., Maxwell AFB, AL USA

Hyperspectral Imagery: Warfighting Through a Different Set of Eyes

Pabich, Paul J; Oct 2002; 73 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463426; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Hyperspectral Imagery, or HSI, is a sophisticated, versatile intelligence gathering technology that could potentially enable the US military to make significant strides towards improving the preparation for and execution of its missions. Many of the difficulties in bringing the promise of HSI to fruition have very little to do with the technology itself. As will be discussed shortly, HSI technology has been successfully demonstrated in a variety of diverse applications. In point of fact, it is the versatility of HSI that may be hindering its implementation into the mainstream of the U.S. military's intelligence gathering capability. The objective of this paper is threefold. The first goal is to introduce the reader to both the technology itself and

the myriad potential applications of Hyperspectral Imagery. The second goal is to realistically examine the challenges that HSI must overcome, specifically in the areas of how HSI fits into the world of joint vision, intelligence doctrine, and the intelligence cycle. Finally, the paper will provide a series of recommendations some focused on organizational issues and others on acquisition issues that will address the majority of the challenges faced by the intelligence community as they endeavor to incorporate an HSI capability into the U.S. intelligence community.

DTIC

Imagery; Warfare; Military Technology; Intelligence

73

NUCLEAR PHYSICS

Includes nuclear particles; and reactor theory. For space radiation see *93 Space Radiation*. For atomic and molecular physics see *72 Atomic and Molecular Physics*. For elementary particle physics see *77 Physics of Elementary Particles and Fields*. For nuclear astrophysics see *90 Astrophysics*.

20070012856 Georgia Inst. of Tech., Atlanta, GA USA

Tissue Tracking: Applications for Brain MRI Classification

Melonakos, John; Gao, Yi; Tannenbaum, Allen; Jan 2007; 10 pp.; In English

Contract(s)/Grant(s): U54-EB005149; NAC-P41-RR-13218

Report No.(s): AD-A462998; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462998>

Bayesian classification methods have been extensively used in a variety of image processing applications, including medical image analysis. The basic procedure is to combine data-driven knowledge in the likelihood terms with clinical knowledge in the prior terms to classify an image into a pre-determined number of classes. In many applications, it is difficult to construct meaningful priors and, hence, homogeneous priors are assumed. In this paper, we show how expectation-maximization weights and neighboring posterior probabilities may be combined to make intuitive use of the Bayesian priors. Drawing upon insights from computer vision tracking algorithms, we cast the problem in a tissue tracking framework. We show results of our algorithm on the classification of gray and white matter along with surrounding cerebral spinal fluid in brain MRI scans. We show results of our algorithm on 20 brain MRI datasets along with validation against expert manual segmentations.

DTIC

Brain; Cerebrospinal Fluid; Classifications; Imaging Techniques; Magnetic Resonance

20070013222 Army War Coll., Carlisle Barracks, PA USA

Gauging U.S.-Indian Strategic Cooperation

Sokolski, Henry; Stephenson, John; Tynan, Peter; Ramana, M V; Mian, Zia; Nayyar, A H; Rajaraman, R; Ferguson, Charles D; Speier, Richard; Perkovich, George; Mar 2007; 425 pp.; In English

Report No.(s): AD-A463365; No Copyright; Avail.: CASI: [A18](#), Hardcopy

This volume consists of research that the Nonproliferation Policy Education Center (NPEC) commissioned and vetted throughout 2006. The volume offers U.S. and Indian policy and law makers a detailed checklist of things to watch, avoid, and try to achieve. These chapters deserve close attention since all are focused on what is needed to assure U.S.-Indian strategic cooperation succeeds.

DTIC

Foreign Policy; India

20070013594 Defence Research and Development Canada, Ottawa, Ontario Canada

Nuclear Forensic Field Exercise 1

Larsson, Carey L; Hinton, Anthony; Nov 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462861; DRDC-ONTARIO-TM-2006-214; No Copyright; Avail.: CASI: [A03](#), Hardcopy

DRDC Ottawa is leading a project designed in part to develop protocols for forensic investigators working in a radiologically contaminated environment. As such, a radiological field exercise was held to review current forensic investigator methods and identify problem areas with respect to the collection of evidence from a contaminated crime scene. The Canadian Nuclear Safety Commission (CNSC), DRDC Ottawa, Royal Canadian Mounted Police (RCMP) and the Ottawa Police Service (OPS) CBRN Forensic Investigation Specialists participated in the exercise. This document provides a

description of the scenario and the responder actions during the exercise, and gives lessons learned and recommendations that will feed directly into the forensic investigator protocols.

DTIC

Nuclear Radiation; Physical Exercise

74 OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

20070011463 California Univ., Santa Cruz, CA USA

Some Examples of Performance of the MDSP Super-Resolution Software (SuperLab)

Aug 2004; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-03-01-0387; NSF-CCR-9984246

Report No.(s): AD-A462370; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462370>

No abstract available

Resolution; Software Engineering

20070011496 Rochester Univ., NY, USA

LLE Review. Quarterly Report. Volume 106 (January-March 2006)

January 2006; 78 pp.; In English

Report No.(s): PB2007-106961; DOE/SF/19460-667; No Copyright; Avail.: National Technical Information Service (NTIS)

;Contents: High-Gain, Polarization-Preserving, Yb-Doped Fiber for Low-Duty-Cycle Pulse Amplification, The Development of Methods and Techniques for the Decontamination of Metals and Alloys, Basic Principles of Direct-Drive Ignition Target Design Tests of the Hydrodynamic Equivalence of Direct-Drive Implosions with Different D2 and 3He Mixtures, Deterministically Polarized Fluorescence from Uniaxially Aligned Single-Dye Molecules, Fiber-Coupled Single-Photon Detectors Based on NbN Superconducting Nanostructures for Practical Quantum Cryptography and Photon-Correlation Studies, Transition Metal Dithiolene Near-IR Dyes and Their Applications in Liquid Crystal Devices, Publications and Conference Presentations.

NTIS

Laser Targets; Lasers

20070011501 Rochester Univ., NY, USA

LLE Review. Quarterly Report. Volume 107 (April-June 2006)

January 2006; 50 pp.; In English

Report No.(s): PB2007-106962; DOE/SF/19460-696; No Copyright; Avail.: National Technical Information Service (NTIS)

;Contents; High-Contrast Plasma-Electrode Pockels Cell (PEPC), Absolute Calibration of Kodak Biomax-MS Film Response to X Rays in the 1.5- to 8-keV Energy Range, Response Model for Kodak Biomax-MS Film to X Rays, High-Yield Bang Time Detector for the OMEGA Laser, Operation of Target Diagnostics in a Petawatt Environment, Gain Apodization in Highly Doped, Distributed-Feedback (DFB) Fiber Lasers, Publications and Conference Presentations.

NTIS

Laser Targets; Lasers

20070011507 Rochester Univ., NY, USA

LLE Review. Quarterly Report. Volume 108 (July-September 2006)

January 2006; 90 pp.; In English

Report No.(s): PB2007-106963; DOE/SF/19460-716; No Copyright; Avail.: National Technical Information Service (NTIS)

;Contents: Cryogenic DT and D2 Targets for Inertial Confinement Fusion, Structural Dynamics of Cryogenic Target Assemblies, Measuring E and B Fields in Laser-Produced Plasmas with Monoenergetic Proton Radiography, Evaluation of Cleaning Methods for Multilayer Diffraction Gratings, Design and Analysis of Binary Beam Shapers Using Error Diffusion,

LLE's Summer High School Research Program, FY06 Laser Facility Report, National Laser Users' Facility and External Users' Programs, Publications and Conference Presentations.

NTIS

Laser Targets; Lasers

20070011510 Alston and Bird, LLP, Charlotte, NC, USA, Alabama Univ., Huntsville, AL, USA

Planar Lightwave Circuit Waveguide Bends and Beamsplitters

Li, L.; Nordin, P.; Jiang, J.; English, J. M.; 25 Oct 04; 22 pp.; In English

Contract(s)/Grant(s): N66001-01-1-8938; EPS-0091853

Patent Info.: Filed Filed 25 Oct 04; US-Patent-Appl-SN-10-973 068

Report No.(s): PB2007-103297; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A planar lightwave circuit has a waveguide having a bend and plurality of multiple trenches with parallel front and back interfaces. The trench and waveguide refractive indexes are different such that a refractive interface is defined between the waveguide and the trench. The trench may include a material of higher refractive index than the waveguide, such as silicon, or alternatively a material having a lower refractive index than the waveguide, such as an air void. The trench is disposed on the waveguide bend such that the front and back planar interfaces have an angle of incidence to a direction of the lightwave propagation from the waveguide. The invention also includes beamsplitters that include trenches that reflect a portion of a lightwave in a first direction and a portion of a lightwave in a second direction.

NTIS

Beam Splitters; Circuits; Waveguides

20070011532 Dickinson Wright, PLLC, Washington, DC, DC, USA, Chicago Univ., Chicago, IL USA

Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps

Grier, D. G.; Dufresne, E. R.; 6 Jan 05; 15 pp.; In English

Contract(s)/Grant(s): DMR-9730189; DMR-9880595

Patent Info.: Filed Filed 6 Jan 05; US-Patent-Appl-SN-11-029 396

Report No.(s): PB2007-103317; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An apparatus and method for manipulating, effecting interaction of, photochemically transforming and/or sorting small dielectric particles or other materials. The apparatus and method involves use of one or more diffractive optical elements which each receive a laser beam and form a plurality of laser beams. These laser beams are operated on by a telescope lens system and then an objective lens element to create an array of optical traps for manipulating, effecting interaction of, photochemically transforming and/or sorting small dielectric particles or other materials.

NTIS

Fabrication; Holography; Optical Equipment; Patent Applications; Traps

20070011536 Wolf Greenfield and Sacks, PC, Boston, MA, USA, Marine Biological Lab., Woods Hole, MA, USA

Orientation Independent Differential Interference Contrast Microscopy Technique and Device

Shribak, M.; 2 Dec 04; 20 pp.; In English

Contract(s)/Grant(s): R01-GM49210

Patent Info.: Filed Filed 2 Dec 04; US-Patent-Appl-SN-11-002 834

Report No.(s): PB2007-103316; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method for performing differential interference contrast microscopy on a specimen includes collecting at least two images with illumination respectively having first and second beam-shear directions relative to a rotational orientation of the specimen, determining data associated with an intensity distribution of each of the collected images, and calculating values having a spatial distribution that is substantially independent of the rotational orientation of the specimen. A differential interference contrast microscope includes a beam-shearing assembly that includes a beam-shearing component. The beam-shearing assembly is configured to provide a variable shear vector without a movement of the beam-shearing component. A microscopy system can include the microscope and an imaging-control unit.

NTIS

Microscopy; Patent Applications

20070011540 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph

Belikov, Ruslan; Give'on, Amir; Trauger, John T.; Carr, Michael; Kasdin, Jeremy N.; Vanderbei, Robert J.; Shi, Fang; Balasubramanian, Kunjithapatham; Kuhnert, Andreas; May 27, 2006; 22 pp.; In English; SPIE Astronomical Telescopes and Instrumentation Conference, 27 May 2006, Orlando, FL, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): JPL-1254357; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39804>

Experimental demonstration of wavefront control with shaped pupils. Contrast level is maintained across different wavelengths and 10% broadband light. Further improvements in contrast believed to have been possible with more time and parameter optimizations.

Derived from text

Broadband; Wave Fronts; Coronagraphs; Extrasolar Planets

20070011547 Swedish Defence Research Establishment, Linköping, Sweden

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report)

Kullander, F.; Allard, L.; Rantakokko, J.; Sakari, P.; Sjoqvist, L.; Dec. 2005; 21 pp.; In Swedish
Report No.(s): PB2007-105502; FOI-R-1847-SE; No Copyright; Avail.: National Technical Information Service (NTIS)

Our activities in the field of optical retro communication have been directed towards demonstrative links at different ranges and aim to show how mobility shall be handled. Along with the mainly experimental efforts, a study of tactical applications was carried out. Some conclusions from the study were that the retro communication is a suitable technology for links from small platforms such as UAV's, buoys, ground units within ground sensor networks and equipment for identification of battlefield units, e.g. for discriminating friends from foes (IFF). A new laser transceiver with active laser beam pointing has been developed. Systematic tests of the technology have been initiated with a particular emphasis on atmospheric effects. Liquid crystals and drive electronics for different trials have been prepared and tested. Modulated retro reflectors have been mounted in a TV broadcasting mast for link trials with a range up to 8 km. Several stationary links have been set up for limited time periods, at a range up to 1.4 km and under various weather conditions. Focal plane arrays of semiconductor quantum wells have been evaluated for use in modulated retro reflector arrangements with the function of both detector and modulator.

NTIS

Free-Space Optical Communication; Lasers; Liquid Crystals; Modulators; Optical Communication; Quantum Wells; Reflectors; Laser Applications

20070011665 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Low-cost Large Aperture Telescopes for Optical Communications

Hemmati, Hamid; August 13, 2006; 5 pp.; In English; SPIE Optics & Photonics, August 13-17, 2006, San Diego, CA, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39817>; <http://dx.doi.org/10.1117/12.682684>

Low-cost, large-aperture optical receivers are required to form an affordable optical ground receiver network for laser communications. Among the ground receiver station's multiple subsystems, here, we only discuss the ongoing research activities aimed at reducing the cost of the large-size optics on the receiver. Experimental results of two different approaches for fabricating low-cost mirrors of wavefront quality on the order of 100-200X the diffraction limit are described. Laboratory-level effort are underway to improve the surface figure to better than 20X the diffraction limit.

Author

Optical Communication; Telescopes; Apertures; Low Cost; Mirrors; Ground Stations

20070011671 Lawrence Livermore National Lab., Livermore, CA USA

Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals

DeMange, P.; Negres, R. A.; Radosky, H. B.; Demos, S. G.; Feb. 07, 2006; 8 pp.; In English
Report No.(s): DE2006-894000; UCRL-CONF-218739; No Copyright; Avail.: Department of Energy Information Bridge

The interaction of damage initiating defect precursors in KDP and DKDP crystals with laser pulses is investigated as a function of laser parameters to obtain experimental results that contain information about the type and nature of the defects. Specifically, the focus is to understand (a) the interaction of the precursors with sub-damage laser pulses leading to

improvement to the damage performance (laser conditioning) and (b) the synergetic effects during multi-wavelength irradiation. Our results expose complex behaviors of the defect precursors associated with damage initiation and conditioning at different wavelengths that provide a major step towards revealing the underlying physics.

NTIS

Crystals; Damage; Defects; Lasers

20070012330 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations

Shi, Fang; Basinger, Scott A.; Redding, David C.; May 26, 2006; 13 pp.; In English; SPIE Astronomical Telescopes and Instrumentation, 24-31 May 2006, Orlando, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39805>

Wavefront aberrations will lower the DFS fringe visibility and DFS signal SNR. The specific effect of wavefront aberration on DFS depends on the aberration type. Due to the 'pixel spatial filter' effect the extracted DFS signal can tolerate moderate amount of wavefront aberrations..By averaging piston detection results from multiple traces extracted from fringe images DFS can further increase its robustness against wavefront aberration. Line-of-sight jitter can cause significant loss of fringe visibility will affect more on the aberrated system..Modeling results have shown that gravity sag on the JWST segment mirror during I&T will lower the DHS fringe visibility by factor of 2-3X and lower the DHS signal intensity by factor of approx.5X. Under gravity sag the RMS DHS detection error approx. 100 nm.

Derived from text

Segmented Mirrors; Wave Fronts; Aberration; Gravitation; Line of Sight; Vibration; Robustness (Mathematics)

20070012571 Lawrence Livermore National Lab., Livermore, CA USA

Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants

Abbott, R. P.; Dec. 15, 2005; 29 pp.; In English

Report No.(s): DE2006-890609; UCRL-TH-217754; No Copyright; Avail.: National Technical Information Service (NTIS)

Left unprotected, both transmissive and reflective final optics in a laser-driven inertial fusion power plant would quickly fail from melting, pulsed thermal stress, or degradation of optical properties as a result of ion implantation. One potential option for mitigating this threat is to magnetically deflect the ions such that they are directed to a robust energy dump. In this paper we detail integrated studies that have been carried out to assess the viability of this approach for protecting final optics.

NTIS

Deflection; Ion Implantation; Ion Optics; Laser Fusion; Lasers

20070012729 Savannah River National Lab., Aiken, SC, USA

Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments

Korinko, P. S.; Adams, T. M.; Oct. 06, 2006; 12 pp.; In English

Contract(s)/Grant(s): DE-AC09-96SR18500

Report No.(s): DE2006-895631; WSRC-STI-2006-00231; No Copyright; Avail.: National Technical Information Service (NTIS)

New methods of repairing mis-machined components are always of interest. In this study, an innovative method using Laser Engineered Net Shape(trademark) (LENS(reg-sign)) forming was used to repair intentionally mis-machined test articles. The components were repaired and subsequently hydrogen charged and burst tested. The LENS repair did not have an adverse effect on the solid state weld process that was used to repair the components. Hydrogen charged samples failed in a similar manner to the uncharged samples. Overall, the prospects for LENS repairing similar products are favorable and further work is encouraged.

NTIS

Hydrogen; Lasers; Shapes; Welded Joints

20070012796 Naval Postgraduate School, Monterey, CA USA

Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region

Lone, Lars O; Dec 2006; 93 pp.; In English; Original contains color illustrations

Report No.(s): AD-A462644; No Copyright; Avail.: CASI: A05, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462644>

The Compact Airborne Spectrographic Imager (CASI) and the satellite Moderate Resolution Imaging Spectroradiometer (MODIS) provide detailed information about the environment U.S. Naval forces choose to operate in. In recent years environmental conditions have been a driving factor in preventing the detection of underwater objects like mines. Suspended sediments are an environmental condition of interest. Remote sensors provide an opportunity to detect suspended sediments in a region prior to the commencement of operations and better prepare the force while reducing time required to complete operations. Monthly data sets collected using MODIS, from February 2005 to February 2005 show variations in weather patterns in the Mississippi Bight that cause the persistent presence of suspended sediments in certain areas of the Mississippi Bight. Major storm events such as hurricanes alter the location that suspended sediments persist in this region during the hurricane season. MODIS with 250m-pixel resolution is capable of detecting large-scale suspended sediment plumes while CASI with 1m-pixel resolution is capable of detecting very fine suspended sediment filaments as well as providing early warning of possible mine locations. As the mine warfare fleet diminishes in size, CASI and MODIS coupled with current sensors may provide an increase in detection capability while reducing the workload of mine detection ships. Continued research and study of suspended sediment transport during hurricane seasons may provide more information about how the environment changes.

DTIC

Coasts; Gulfs; Imagery; Satellite Imagery

20070012976 L-3 Communications., San Antonio, TX USA

Numerical Solution of the Extended Nonlinear Schrodinger Equation

Harvey, John V; Medina, JR, Richard L; Sep 2006; 199 pp.; In English

Contract(s)/Grant(s): F41624-03-D-6002; Proj-2304

Report No.(s): AD-A463325; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463325>

High-resolution mathematical models of the extended nonlinear Schroedinger equation have been designed which include diffraction combined with non-zero second-order group-velocity dispersion (GVD). These models follow a Gaussian pulse as it propagates in air to a large distance (several meters). With diffraction disabled, a pulse quickly collapses to a single singularity on the propagation axis. Alternatively, with diffraction included, a pulse will collapse into a pair of fins off the propagation axis. If the GVD is disabled, the fins eventually collapse to singularities. However, if the GVD is set an appropriate non-zero value, the fins can be propagated out to several meters (propagation distance) without singularities forming. In test cases with diffraction plus GVD, we see (A) an initial drop in intensity, followed by (B) a rise at about 2 to 3 meters, and then (C) a gradual drop thereafter. This pattern is most pronounced in our energy pattern depictions where we model the distribution of the total energy seen by a target plane as the pulse quickly passes through it. When viewed on a target plane at an optimal distance (roughly 2.5 meters), the energy pattern appears as a bright ring indicating that the initial Gaussian pulse has collapsed to a very thin cylindrical shape. Our results are based solely on mathematical formulations without any experimental verification. Additionally, these formulations do not attempt to completely ensure energy conservation.

DTIC

Electromagnetic Wave Transmission; Mathematical Models; Nonlinear Equations; Nonlinear Optics; Schroedinger Equation

20070013445 Lawrence Livermore National Lab., Livermore, CA USA

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers

Chapman, H. N.; Bajt, S.; Barty, A.; Benner, W. H.; Bogan, M. J.; Aug. 2006; 9 pp.; In English

Report No.(s): DE2006-894766; UCRL-PROC-223922; No Copyright; Avail.: National Technical Information Service (NTIS)

The ultrafast pulses from X-ray free-electron lasers will enable imaging of non-periodic objects at near-atomic resolution. These objects could include single molecules, protein complexes, or virus particles. The specimen would be completely destroyed by the pulse in a Coulomb explosion, but that destruction will only happen after the pulse. The scattering from the sample will give structural information about the undamaged object. There are many technical challenges that must be addressed before carrying out such experiments at an XFEL, which we are doing so with experiments at FLASH, the soft-X-ray FEL at DESY.

NTIS

Diffraction; Free Electron Lasers; Imaging Techniques; X Ray Diffraction; X Ray Lasers

75
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see 46 *Geophysics*. For space plasmas see 90 *Astrophysics*.

20070012846 Air Force Research Lab., Wright-Patterson AFB, OH USA

A Microwave-Augmented Plasma Torch Module

Kuo, S P; Bivolaru, Daniel; Williams, Skip; Carter, Campbell D; Mar 2006; 12 pp.; In English

Contract(s)/Grant(s): Proj-2308

Report No.(s): AD-A462972; AFRL-PR-WP-TP-2006-252; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462972>

A new plasma torch device which combines arc and microwave discharges to enhance the size and enthalpy of the plasma torch is described. A cylindrical-shaped plasma torch module is integrated into a tapered rectangular cavity to form a microwave adaptor at one end, which couples the microwave power injected into the cavity from the other end to the arc plasma generated by the torch module. A theoretical study of the microwave coupling from the cavity to the plasma torch, as the load, is presented. The numerical results indicate that the microwave power coupling efficiency exceeds 80%. Operational tests of the device indicate that the microwave power is coupled to the plasma torch and that the arc discharge power is increased. The addition of microwave energy enhances the height, volume and enthalpy of the plasma torch when the torch operates at a low airflow rate, and even when the flow speed is supersonic, a noticeable microwave effect on the plasma torch is observed. In addition, the present design allows the torch to be operated as both a fuel injector and igniter. Ignition of ethylene fuel injected through the center of a tungsten carbide tube.

DTIC

Combustion; Microwaves; Plasma Torches; Plasmas (Physics); Torches

20070013243 HFC Consulting, Westerville, OH USA

Applying MHD Results to a Scramjet Vehicle

Chambers Jr, Harold F; Feb 12, 2007; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-C-0160; Proj-2308

Report No.(s): AD-A463441; No Copyright; Avail.: CASI: A03, Hardcopy

The DOE MHD Power Generation Program contained a broad range of scientific, engineering, and modeling activities including the study of plasma composition and structure, equilibrium and non-equilibrium ionization, plasma flow, arc formation and extinction, high temperature materials, and non-intrusive gas diagnostics. In this report, results from the DOE Program, and related international activities, were reviewed for their potential to complement research conducted under the AFOSR Theme 'Plasma Dynamics for Aerospace Applications'. Recommendations for the AFOSR Theme included: (1) Use of a two-g%temperature model for improved calculation of plasma properties and plasma modeling, (2) Operating conditions for potential improved stability and arc prevention in the boundary layer for plasma aerodynamic flow control, (3) Use of demonstrated non-intrusive diagnostics for plasma and boundary layer measurements, and (4) Testing of high-temperature materials for an MHD generator.

DTIC

Magnetohydrodynamics; Supersonic Combustion Ramjet Engines

20070013334 Wright State Univ., Dayton, OH USA

Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint)

Menart, J; Stanfield, S; Shang, J; Kimmel, Roger L; Hayes, J; Jan 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-A03U

Report No.(s): AD-A463675; No Copyright; Avail.: CASI: A03, Hardcopy

This work is an experimental effort to study the power efficiency of using a plasma discharge to alter the lift on a body or surface. In this paper several electrode geometries are considered in an effort to reduce the plasma power required for a given change in lift. The cathode electrode position and electrode size are studied. For all cases studied the anode electrode is kept the same. Results are presented for four different size cathodes and four different cathode positions. The primary result presented is the lift change produced by the discharge per unit power input. The lift is determined by measuring the deflection of the model under the applied plasma. This type of a measurement system has some advantages and disadvantages compared to a load cell lift measurement system used by the authors in past work. Results from each of these lift measurement tools

compare well. Results for 9 and 24 mA DC discharges are shown in this paper. For the conditions utilized in this work the results indicate that both cathode position and cathode size affect the lift change caused by a plasma discharge per unit of power input.

DTIC

Electrodes; Hypersonic Speed; Plasma Electrodes; Plasma Jets

20070013487 Department of Energy, Germantown, MD, USA, Massachusetts Inst. of Tech., Cambridge, MA, USA
Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final

Thio, F.; Chen, C.; Oct. 26, 2006; 27 pp.; In English

Contract(s)/Grant(s): FG02-01ER54662

Report No.(s): DE2006-894065; DOE/ER/54662-1; No Copyright; Avail.: National Technical Information Service (NTIS)

Under the auspices of the research grant, the Intense Beam Theoretical Research Group at Massachusetts Institute of Technology's Plasma Science and Fusion Center made significant contributions in a number of important areas in the HIF and HEDP research, including: (a) Derivation of rms envelope equations and study of rms envelope dynamics for high-intensity heavy ion beams in a small-aperture AG focusing transport systems; (b) Identification of a new mechanism for chaotic particle motion, halo formation, and beam loss in high-intensity heavy ion beams in a small-aperture AG focusing systems; Development of elliptic beam theory; (d) Study of Physics Issues in the Neutralization Transport Experiment (NTX).

NTIS

Ion Beams; Ion Sources; Targets

20070013612 Toulouse Univ., France

Microdischarge Sources of O₂(singlet Delta)

Pitchford, Leanne C; Boeuf, Jean-Pierre; Puech, Vincent; Rousseau, Antoine; Jul 15, 2006; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-05-1-3038; F18655-05-1-3039

Report No.(s): AD-A462987; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462987>

The focus was to obtain yield measurements in DC microdischarges but there will also be an important modeling component conducted in parallel with the experiments. The existing MHCD model was developed for rare gases, and this will be extended to include a description of the O₂ kinetics based on previously published work. A particularly important parameter is the gas temperature and the gas heating source term in the model also needs to be extended to include V-T (vibrational to translation) energy exchange ion heating in the sheath (expected to be the dominant component) is included in our present model). We originally proposed measuring the O₂(1D) yield using IR absorption spectroscopy and we still feel that it will eventually be necessary to develop this or another or the more traditional spectroscopic methods (eg CARS or UV absorption). However, during the proof-of-principle phase of this project we propose using an isothermal calorimeter as has been developed previously for measurements of O₂(1D) yields by several groups 7,8. We have been in contact with Dr. Ikonnikov and he has kindly provided us with additional information on the set-up of Lodin et al¹⁷. This calorimetric technique is, in our opinion the best way to obtain a quick inexpensive and accurate estimate of the O₂(1D) yield in a single microdischarge operating in a DC mode. The experimental set-up is simple a nickel coil is positioned in the gas flow on the downstream side of the microdischarge and the chemical energy in the gas flow is detected as a change in the external power required to maintain the coil at a constant temperature (eg 150 degrees C). This power is reduced when O₂(1D) is deactivated at the coil surface. The Russian group⁷ used a self-balancing bridge circuit to maintain the constant temperature and they calibrated their system by measuring the O₂(1D) emission signal before and after the detector. They determined that between 70 and 90% of the O₂(1D) reacted with the nickel coil.

DTIC

Laser Plasmas; Mathematical Models; Gas Discharges; Oxygen

20070013718 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA GRC and MSFC Space-Plasma Arc Testing Procedures

Ferguson, Dale C.; Vayner, Boris V.; Galofaro, Joel T.; Hillard, G. Barry; Vaughn, Jason; Schneider, Todd; [2007]; 11 pp.; In English

Report No.(s): MS# TPS1227; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013718>

Tests of arcing and current collection in simulated space plasma conditions have been performed at the NASA Glenn Research Center (GRC) in Cleveland, Ohio, for over 30 years and at the Marshall Space Flight Center (MSFC) in Huntsville, Alabama, for almost as long. During this period, proper test conditions for accurate and meaningful space simulation have been worked out, comparisons with actual space performance in spaceflight tests and with real operational satellites have been made, and NASA has achieved our own internal standards for test protocols. It is the purpose of this paper to communicate the test conditions, test procedures, and types of analysis used at NASA GRC and MSFC to the space environmental testing community at large, to help with international space-plasma arcing-testing standardization. Discussed herein are neutral gas conditions, plasma densities and uniformity, vacuum chamber sizes, sample sizes and Debye lengths, biasing samples versus self-generated voltages, floating samples versus grounded samples, test electrical conditions, arc detection, preventing sustained discharges during testing, real samples versus idealized samples, validity of LEO tests for GEO samples, extracting arc threshold information from arc rate versus voltage tests, snapover, current collection, and glows at positive sample bias, Kapton pyrolysis, thresholds for trigger arcs, sustained arcs, dielectric breakdown and Paschen discharge, tether arcing and testing in very dense plasmas (i.e. thruster plumes), arc mitigation strategies, charging mitigation strategies, models, and analysis of test results. Finally, the necessity of testing will be emphasized, not to the exclusion of modeling, but as part of a complete strategy for determining when and if arcs will occur, and preventing them from occurring in space.

Author

Space Plasmas; NASA Programs; Arc Discharges; Plasma Jets; Simulation

76

SOLID-STATE PHYSICS

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering*; and *36 Lasers and Masers*.

20070011629 NASA Johnson Space Center, Houston, TX, USA

Nanomaterials Work at NASA-Johnson Space Center

Arepalli, Sivaram; [2005]; 1 pp.; In English; Nano 2005: International Nano Conference, 13-15 Jul. 2005, Sivakasi, India
Contract(s)/Grant(s): NAS9-19100; No Copyright; Avail.: Other Sources; Abstract Only

Nanomaterials activities at NASA-Johnson Space Center focus on single wall carbon nanotube production, characterization and their applications for aerospace. Nanotubes are produced by arc and laser methods and the growth process is monitored by in-situ diagnostics using time resolved passive emission and laser induced fluorescence of the active species. Parametric study of both these processes are conducted to monitor the effect of production parameters including temperature, buffer gas, flow rate, pressure, laser fluence and arc current. Characterization of the nanotube material is performed using the NASA-JSC protocol developed by combining analytical techniques of SEM, TEM, UV-VIS-NIR absorption, Raman, and TGA. Efforts at JSC over the past five years in composites have centered on structural polymernanotube systems. Recent activities broadened this focus to multifunctional materials, supercapacitors, fuel cells, regenerable CO₂ absorbers, electromagnetic shielding, radiation dosimetry and thermal management systems of interest for human space flight. Preliminary tests indicate improvement of performance in most of these applications because of the large surface area as well as high conductivity exhibited by SWCNTs.

Author

Carbon Nanotubes; Nanostructure (Characteristics); Aerospace Industry; NASA Programs; Nanostructure Growth

20070012739 Jefferson (Thomas) National Accelerator Facility, Newport News, VA, USA

Upgrading the CEBAF Accelerator to 12 GeV

Harwood, L.; January 2006; 3 pp.; In English

Report No.(s): DE2006-895609; No Copyright; Avail.: Department of Energy Information Bridge

Jefferson Lab is preparing to upgrade its 6 GeV Continuous Electron Beam Accelerator Facility (CEBAF) to 12 GeV. The doubled energy will significantly extend research reach of the three existing experimental Halls A, B and C, and the upgrade will add scientific capability, with a newly constructed hall, Hall D. Areas of special initial interest are reactions at high xBjorken, GPD's and exotic hybrid mesons. The present linacs will have their acceleration roughly doubled through the addition of 10 new cryomodules which will perform at (approx)5 times the original specification for CEBAF. The cryogenics plant will be roughly doubled and new rf systems will be installed for the new cryomodules. The beam transport system will strongly leverage existing hardware but must be enhanced with new power supplies, one new recirculation arc, and a beamline

to the new Hall D. A brief description of the scope for the various accelerator subsystems will be given as well as the status of the project as a whole.

NTIS

Electron Beams; Linear Accelerators; Particle Accelerators

20070012912 Drexel Univ., Philadelphia, PA USA

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint)

Wu, Xianping; Kalidindi, Surya R; Necker, Carl; Salem, Ayman; Sep 2006; 27 pp.; In English

Contract(s)/Grant(s): F33615-03-D-5801; DMR-0201382; Proj-4349

Report No.(s): AD-A463095; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463095>

A new Taylor-type polycrystalline model has been developed to simulate the evolution of crystallographic texture and the anisotropic stress-strain response during large deformation of high purity alpha-titanium at room temperature. Crystallographic slip, deformation twinning, and slip inside the twinned regions were all considered as contributing mechanisms for the plastic strain in the model. This was accomplished by treating the dominant twin systems in a given crystal as independent grains once the total twin volume fraction in that crystal reached a predetermined saturation value. The newly formed grains were allowed to independently undergo further slip and the concomitant lattice rotation, but further twinning was prohibited. New descriptions have been proposed for slip and twin hardening and the complex coupling between them. Good predictions were obtained for the overall anisotropic stress-strain response and the texture evolution in three different monotonic deformation paths on annealed, initially textured samples of high purity alpha-titanium.

DTIC

Anisotropy; Crystallography; Crystals; Models; Plastic Properties; Purity; Retraining; Stress-Strain Relationships; Textures; Titanium

20070013293 Army Research Lab., Aberdeen Proving Ground, MD USA

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization

Clayton, John D; Chung, Peter W; Feb 2007; 42 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-DRI-FY05-CIS-10

Report No.(s): AD-A463528; ARL-RP-161; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Presented is a multiscale methodology enabling description of the fundamental mechanical behavior of crystalline materials at the length scale of a macroscopic continuum (i.e., millimeter resolution) given a characterization of discrete atomic interactions at the nanoscale (i.e., angstrom resolution). Asymptotic homogenization methods permit the calculation of effective mechanical properties (e.g. strain energy, stress, and stiffness) of a representative crystalline volume element containing statistically periodic defect structures. From a numerical standpoint, the theoretical computational method postulated and implemented here in the context of lattice statics enables prediction of minimum energy configurations of imperfect atomic-scale crystals deformed to finite strain levels. Numerical simulations demonstrate the utility of our framework for the particular case of bodycentered-cubic tungsten. Elastic stiffness and energetic properties of periodic unit cells containing vacancies, screw dislocations, and low-angle twist boundaries are computed. Nonlinear aspects of elastic behavior in the context of plastic flow are then modeled from the perspective of atomistic-to-continuum homogenization, following the introduction of a minimal set of kinetic assumptions required to account for the propagation of dislocations across the unit cell at finite deformations.

DTIC

Asymptotic Methods; Atomic Physics; Continuum Mechanics; Continuums; Crystallization; Crystals; Homogeneity; Homogenizing; Mechanics (Physics); Nonlinear Systems; Nonlinearity; Normality

20070013498 Florida State Univ., Tallahassee, FL, USA

Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering

Safron, S. A.; Skofronick, J. G.; Van Winkle, D. H.; Sep. 27, 2006; 21 pp.; In English

Contract(s)/Grant(s): FG02-97ER45635

Report No.(s): DE2006-891992; DOE/ER/45635-7; No Copyright; Avail.: Department of Energy Information Bridge

The aim of this work is to study the structure and dynamics of crystalline surfaces. The materials under investigation at this time are metal oxides and organic insulators grown as ultra thin films onto crystalline substrates. We have focused on

insulating surfaces and films because they have special materials properties which are of current interest and, in particular, their structures and lattice dynamics remain largely unexplored since they are difficult to examine with other surface science techniques. Helium Atom Scattering (HAS) is unique among these techniques in employing a low-energy, electrically neutral and non-penetrating probe that does not charge or damage the surface. While there are many technologically important oxide surfaces which could be studied, we have so far restricted our efforts to the perovskite KTaO_3 , pure and doped with Nb, and TiO_2 . At the same time we have continued our characterization of ultra thin polyphenylene films vapordeposited onto alkali halide (001) substrates. We described the results of experiments on pure KTaO_3 in our Progress Report for last year.

NTIS

Crystallinity; Electron Scattering; Helium Atoms; Scattering; Thin Films

77

PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also *72 Atomic and Molecular Physics*, *73 Nuclear Physics*, and *25 Inorganic, Organic and Physical Chemistry*.

20070011554 Stanford Linear Accelerator Center, CA, USA, Varian Associates, Palo Alto, CA, USA

Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials

Liu, J. C.; Kase, K. R.; Mao, X. S.; Nelson, W. R.; Kleck, J. H.; January 2006; 5 pp.; In English

Report No.(s): DE2006-895272; SLAC-PUB-7404; No Copyright; Avail.: Department of Energy Information Bridge

Monte Carlo calculations of the giant-dipole-resonance photoneutrons (GRN) around the Varian Clinac 2100C/2300C medical accelerator heads (10-20 MV modes) were made using the coupled EGS4-MORSE code. The actual head materials and geometries were simulated in great detail using the Combinatorial Geometry facility of MORSE. The neutron production (i.e., sites and yields) was calculated with EGS4 and, then, the neutron transport in the accelerator head was done with MORSE. Both the evaporation and direct neutron components of the GRN were considered by incorporating the EVAP4 code and an empirical algorithm, respectively, into MORSE. With the calculated neutron spectra around the head as source terms, MCNP4a was used to estimate the corresponding dose equivalent transmission (considering both the neutron attenuation and the build-up of captured gamma rays) in several different types of concrete. The calculated results of the absolute neutron fluence and spectra around the heads, as well as the transmission curves, are presented and discussed.

NTIS

Photoneutrons; Accelerators; Monte Carlo Method; Transmission; Combinatorial Analysis

20070012716 Brookhaven National Lab., Upton, NY, USA

Beam Transport Lines for the BSNS

Wei, J.; Jun. 2006; 5 pp.; In English

Report No.(s): DE2006-894616; BNL-77113-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

This paper presents the design of two beam transport lines at the BSNS: one is the injection line from the Linac to the RCS and the other is the target line from the RCS to the target station. In the injection beam line, space charge effects, transverse halo collimation, momentum tail collimation and debunching are the main concerned topics. A new method of using triplet cells and stripping foils is used to collimate transverse halo. A long straight section is reserved for the future upgrading linac and debuncher. In the target beam line, large halo emittance, beam stability at the target due to kicker failures and beam jitters, shielding of back-scattering neutrons from the target are main concerned topics. Special bi-gap magnets will be used to reduce beam losses in the collimators in front of the target.

NTIS

Linear Accelerators; Beamforming; Beams (Radiation); Collimation

20070012718 Brookhaven National Lab., Upton, NY, USA

Intense Neutrino Beams and Leptonic CP Violation

Marciano, W. J.; Parsa, Z.; Oct. 2006; 9 pp.; In English

Report No.(s): DE2006-894618; BNL-77136-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Effects of the Leptonic CP violating phase, (δ), on 3 generation neutrino oscillation rates and asymmetries are discussed. A figure of merit argument is used to show that our ability to measure the phase δ is rather insensitive to the value of (θ_{13}) (for $\sin^2 2\theta_{13} \approx 0.01$) as well as the detector distance (for very long oscillation baselines). Using a study of (ν_{μ}) ($\nu_{\mu} \rightarrow \nu_e$) oscillations for BNL-Homestake (2540 km) we show that a

conventional horn focused wide band neutrino beam generated by an intense 1-2 MW proton source combined with a very large water Cherenkov detector (250-500 kton) should be able to determine θ_{13} to about $(\pm)15^\circ$ in 5×10^7 sec. of running. In addition, such an effort would also measure the other oscillation parameters (θ_{12}), Δm_{21}^2 with high precision. Similar findings apply to a Fermilab-Homestake (1280 km) baseline. We also briefly discuss features of Superbeams, Neutrino Factories and Beta-Beams.

NTIS

CP Violation; Invariance; Leptons; Neutrino Beams

81

ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20070013547 NASA Johnson Space Center, Houston, TX, USA

Bridging the Divide between Safety and Risk Management for your Project or Program

Lutomski, Mike; October 25, 2005; 1 pp.; In English; IAAS Conference Space Safety, A New Beginning, 25-27 Oct. 2005, Nice, France; No Copyright; Avail.: Other Sources; Abstract Only

This presentation will bridge the divide between these separate but overlapping disciplines and help explain how to use Risk Management as an effective management decision support tool that includes safety. Risk Management is an overarching communication tool used by management to prioritize and effectively mitigate potential problems before they concur. Risk Management encompasses every kind of potential problem that can occur on a program or project. Some of these are safety issues such as hazards that have a specific likelihood and consequence that need to be controlled and included to show an integrated picture of accepted) mitigated, and residual risk. Integrating safety and other assurance disciplines is paramount to accurately representing a program s or projects risk posture. Risk is made up of several components such as technical) cost, schedule, or supportability. Safety should also be a consideration for every risk. The safety component can also have an impact on the technical, cost, and schedule aspect of a given risk. The current formats used for communication of safety and risk issues are not consistent or integrated. The presentation will explore the history of these disciplines, current work to integrate them, and suggestions for integration for the future.

Author

Risk; Safety Management; Project Management; Communication

82

DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer program documentation see *61 Computer Programming and Software*.

20070011464 Naval Research Lab., Washington, DC USA

A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System

Kang, Myong H; Costich, Oliver; Froscher, Judith N; Jan 1992; 17 pp.; In English

Contract(s)/Grant(s): N00014-89-C-2389

Report No.(s): AD-A462360; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462360>

A new transaction model for multilevel-secure databases which use the replicated architecture is presented. A basic concurrency control algorithm and two variations are given based on this transaction model. We also present new correctness criteria for multilevel-secure databases which use the replicated architecture. Based on this criteria, we prove that our algorithms are correct.

DTIC

Data Bases; Mathematical Models

20070011531 Transportation Research Board, Washington, DC, USA, Booz-Allen and Hamilton, Inc., McLean, VA USA
Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F

Mar. 2003; 79 pp.; In English

Report No.(s): PB2007-106704; NCHRP-55; Copyright; Avail.: National Technical Information Service (NTIS)

The report is the appendices for the full report titled 'Environmental Information Management and Decision Support System, Implementation Handbook'.

NTIS

Decision Support Systems; Environment Management; Handbooks; Information Management; Management Systems

20070011573 Transportation Research Board, Washington, DC, USA, Concorr, Inc., Ashburn, VA, USA
Integrating Geospatial Technologies into the Right-of-Way Data-Management Process: Appendixes A through F

Hancock, K. L.; Jun. 2006; 251 pp.; In English

Report No.(s): PB2007-106735; NCHRP-95; Copyright; Avail.: National Technical Information Service (NTIS)

Right-of-way (ROW) issues commonly cause project delay and increased costs. While many state DOTs use technology such as Computer-Aided Drafting and Design (CADD) to draft right-of-way plans, the final, approved plans are often manually recorded and filed on paper or mylar. Posting and storing such data by hand is obsolete, inefficient, and unresponsive to the demands of modern project management, encumbering multiple users from conveniently accessing real-time ROW information and resulting in undue delay and cost overruns. Moreover, paper and mylar records are more vulnerable to damage or destruction in the event of fire, flooding, or other catastrophic event. Manually recorded ROW information includes agency ownership, appraisal information, acquisition status, and property-management functions that are important for addressing real estate issues, utilities, environmental permitting and mitigation, access management, maintenance, and programming. Electronic management of this information improves coordination and consistency of data, leading to reduced project delivery delays caused by ROW acquisition. In addition, the ability to retrieve these data electronically provides fast, convenient, and consistent access to all users, reducing the time and expense needed to ship documents; eliminating repetitive entries; minimizing data-entry errors caused by multiple formats; and ultimately saving money for the DOTs. Electronic management of real estate information could improve coordination with local jurisdictions and provide appropriate data to the public on agency ownership of property. The automation of ROW functions and development of data-integration models using existing technology, including geo-spatial applications, are needed to enable multiple users to access the ROW information quickly and easily. Identifying the data elements needed to support the automation of ROW functions is the first step in the development of fully operational systems that integrate geo-spatial technologies into the ROW process.

NTIS

Data Management

20070011672 Transportation Research Board, Washington, DC, USA, Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA

Integrating Geospatial Technologies into the Right-of-Way Data-Management Process

Dec. 2006; 14 pp.; In English

Report No.(s): PB2007-106709; Copyright; Avail.: National Technical Information Service (NTIS)

This digest presents the key findings from NCHRP Project 8-55, Integrating Geospatial Technologies into the Right-of-Way Data-Management Process, conducted by Kathleen L. Hancock, Center for Geospatial Information Technology, Virginia Polytechnic Institute and State University, Alexandria, Virginia.

NTIS

Data Management; Information Systems

20070011770 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Serving Fisheries and Ocean Metadata to Communities Around the World

Meaux, Melanie; [2006]; 1 pp.; In English; Department of Fisheries and Oceans (DFO), Canada, Metadata Workshop, 2-3 Mar. 2006, Ontario, Canada

Contract(s)/Grant(s): NAS5-00220; No Copyright; Avail.: Other Sources; Abstract Only

NASA's Global Change Master Directory (GCMD) assists the oceanographic community in the discovery, access, and sharing of scientific data by serving on-line fisheries and ocean metadata to users around the globe. As of January 2006, the directory holds more than 16,300 Earth Science data descriptions and over 1,300 services descriptions. Of these, nearly 4,000

unique ocean-related metadata records are available to the public, with many having direct links to the data. In 2005, the GCMD averaged over 5 million hits a month, with nearly a half million unique hosts for the year. Through the GCMD portal (<http://qcrnd.nasa.gov/>), users can search vast and growing quantities of data and services using controlled keywords, free-text searches or a combination of both. Users may now refine a search based on topic, location, instrument, platform, project, data center, spatial and temporal coverage. The directory also offers data holders a means to post and search their data through customized portals, i.e. online customized subset metadata directories. The discovery metadata standard used is the Directory Interchange Format (DIF), adopted in 1994. This format has evolved to accommodate other national and international standards such as FGDC and ISO19115. Users can submit metadata through easy-to-use online and offline authoring tools. The directory, which also serves as a coordinating node of the International Directory Network (IDN), has been active at the international, regional and national level for many years through its involvement with the Committee on Earth Observation Satellites (CEOS), federal agencies (such as NASA, NOAA, and USGS), international agencies (such as IOC/IODE, UN, and JAXA) and partnerships (such as ESIP, IOOS/DMAC, GOSIC, GLOBEC, OBIS, and GoMODP), sharing experience, knowledge related to metadata and/or data management and interoperability.

Author

Data Bases; Fisheries; Oceanography; On-Line Systems

20070012574 Environmental Protection Agency, Washington, DC USA

Interactive Pit Lakes 2004 Conference (on CD-ROM)

Mar. 2006; In English

Report No.(s): PB2007-500013; No Copyright; Avail.: National Technical Information Service (NTIS)

This CD-ROM and the workshop provide a pit lakes forum for the exchange of scientific information on current domestic and international approaches, including arid and wet regions throughout the world. These approaches include characterization, modeling/monitoring, and treatment and remediation of pit lakes. The advancement of these approaches will lay a stronger foundation for environmental decision-making by improving the means of identifying and prioritizing mining pit lake impacts and alternatives for their restoration.

NTIS

CD-ROM; Conferences; Lakes; Mining

20070012575 Environmental Protection Agency, Washington, DC USA

Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM)

Jul. 1994; In English

Report No.(s): PB2007-500012; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. EPA sponsored a project to collect and catalog information from wastewater treatment wetlands into a computer database. EPA has also written a user friendly, stand-alone, menu-driven computer program to allow anyone with DOS 3.3 or higher to access the information in the database. The database contains information for 323 wetland cells at 178 locations in the US and Canada. The information includes general information as well as water quality data (BOD, TSS, N-series, P, DO, and decal coliforms). The database is a collection of existing information. No new data were generated by this project.

NTIS

CD-ROM; Data Base Management Systems; Data Bases; Habitats; Wetlands; Wildlife

20070012816 Wyle Labs., Inc., Huntsville, AL USA

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report

Vesper, Troy; Feb 5, 2007; 112 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): HC1047-05-D-4005

Report No.(s): AD-A462925; LR-69031-190; No Copyright; Avail.: CASI: [A06](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462925>

No abstract available

Budgeting; Cost Effectiveness; Financial Management; Information; Information Analysis; Information Systems; Reliability Analysis

20070012819 Naval Research Lab., Washington, DC USA

Increasing Assurance with Literate Programming Techniques

Moore, Andrew P; Payne, Jr, Charles N; Jan 1996; 13 pp.; In English

Report No.(s): AD-A462931; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462931>

The assurance argument that a trusted system satisfies its information security requirements must be convincing, because the argument supports the accreditation decision to allow the computer to process classified information in an operational environment. Assurance is achieved through understanding, but some evidence that supports the assurance argument can be difficult to understand. This paper describes a novel application of a technique, called literate programming [11], that significantly improves the readability of the assurance argument while maintaining its consistency with formal specifications that are input to specification and verification systems. We describe an application of this technique to a simple example and discuss the lessons learned from this effort.

DTIC

Computer Programming; Security

20070012844 Massachusetts Univ., Amherst, MA USA

Tandem Learning: A Learning Framework for Document Categorization

Raghavan, Hema; May 2007; 174 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): HR0011-06-C-0023; N66001-02-1

Report No.(s): AD-A462970; No Copyright; Avail.: CASI: A08, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462970>

Supervised machine learning techniques rely on the availability of ample training data in the form of labeled instances. However, in text, users can have a strong intuition about the relevance of features, that is, words that are indicative of a topic. In this work we show that user prior knowledge on features is useful for text classification, a domain with many irrelevant and redundant features. The benefit of feature selection is more pronounced when the objective is to learn a classifier with as few training examples as possible. We will demonstrate the role of feature feedback in training a classifier to suitable performance quickly. We find that aggressive feature feedback is necessary to focus the classifier during the early stages of active learning by mitigating the Hughes phenomenon. We will describe an algorithm for tandem learning that begins with a couple of labeled instances, and then at each iteration recommends features and instances for a user to label. The algorithm contains methods to incorporate feature feedback into Support Vector Machines. We design an oracle to estimate an upper bound on tandem learning performance. Tandem learning using an oracle results in much better performance than learning on only features or only instances. We find that humans can emulate the oracle to an extent that results in performance (accuracy) comparable to that of the oracle. Our unique experimental design helps factor out system error from human error, leading to a better understanding of when and why interactive feature selection works from a user perspective. We also design a set of difficulty measures that capture the inherent instance and feature complexity of a problem. We verify the robustness of our measures by showing how instance and feature complexity are highly correlated. Our complexity measures serve as a tool to understand when tandem learning is beneficial for text classification.

DTIC

Classifications; Data Processing; Machine Learning; Texts

20070012858 Naval Research Lab., Washington, DC USA

Data Dependence Analysis for an Untrusted Transaction Manager

Kang, Myong H; Jan 1992; 9 pp.; In English

Report No.(s): AD-A463000; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463000>

There are two components in the scheduler for multilevel-secure databases which use the replicated architecture; global and local schedulers. Since the global scheduler, which enforces data consistency among replicas, has to make scheduling decisions based on transactions (i.e., without any knowledge of actual data or physical layout of data), an accurate analysis technique which can detect conflicts among queries is needed. The data dependence analysis introduced here provides a method for precisely determining whether the portions of relations affected by various database operations overlap without the knowledge of actual data.

DTIC

Data Bases; Security

20070012900 Library of Congress, Washington, DC USA

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options

Fischer, Eric A; Feb 22, 2005; 61 pp.; In English

Report No.(s): AD-A463076; CRS-RL32777; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463076>

Even before the terrorist attacks of September 2001, concerns had been rising among security experts about the vulnerabilities to attack of computer systems and associated infrastructure. Yet, despite increasing attention from federal and state governments and international organizations, the defense against attacks on these systems has appeared to be generally fragmented and varying widely in effectiveness. Concerns have grown that what is needed is a national cybersecurity framework -- a coordinated, coherent set of public- and private-sector efforts required to ensure an acceptable level of cybersecurity for the nation. As commonly used, 'cybersecurity' refers to three things: measures to protect information technology; the information it contains, processes, and transmits, and associated physical and virtual elements; the degree of protection resulting from application of those measures; and the associated field of professional endeavor. Virtually any element of cyberspace can be at risk, and the degree of interconnection of those elements can make it difficult to determine the extent of the cybersecurity framework that is needed. Identifying the major weaknesses in U.S. cybersecurity is an area of some controversy. However, some components appear to be sources of potentially significant risk because either major vulnerabilities have been identified or substantial impacts could result from a successful attack. There are several options for broadly addressing weaknesses in cybersecurity. They include adopting standards and certification, promulgating best practices and guidelines, using benchmarks and checklists, use of auditing, improving training and education, building security into enterprise architecture, using risk management, and using metrics.

DTIC

Computer Networks; Countermeasures; Policies; Security; United States

20070012908 Evidence Based Research, Inc., Vienna, VA USA

Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM

Garstka, John; Holloman, Kimberly; Balisle, Christine W; Adkins, Mark; Kruse, Jon; Jan 2006; 33 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W74V8H-04-D-0051

Report No.(s): AD-A463086; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463086>

The USA Ship (USS) Carl Vinson (CVN-70) battle group, commanded by Rear Admiral (RADM) (now retired) Thomas E. Zelibor, departed its home port in Bremerton, Washington, on July 23, 2001, ready for a scheduled deployment in support of Operation SOUTHERN WATCH in the Arabian Gulf. On September 11, 2001, the same day that the battle group reached the North Arabian Sea, the al-Qaeda terrorist network attacked the Pentagon, the Twin Towers of the World Trade Center in New York City, and crashed a plane into a rural Pennsylvania field. Over the next several months, the battle group would undertake combat activities it had not planned for and would work in a joint and combined environment fighting the war on terror during Operation ENDURING FREEDOM (OEF). RADM Zelibor, having seen the power of network centric warfare (NCW) firsthand during the Global 2000 wargame, implemented transformational practices that changed the very nature of command and control (C2) within his command. He saw the need for a more efficient and effective way of conducting daily activities. He sought to change the way those in his command could get information and react to that information by reducing the amount of time needed to prepare briefs (that were outdated as soon as they were created) and by introducing the idea of adding time for staff planning. Under RADM Zelibor's guidance, the sailors and staff were able to transform daily operations and work together more efficiently to achieve their mission. RADM Zelibor's task force grew by orders of magnitude after the September 11 attacks, the sailors and staff were so successful at streamlining the daily operational process that they were able to make distinct changes that allowed them to experience a shared understanding of the battlespace, to collaborate, and to develop mission objectives more quickly.

DTIC

Command and Control; Computer Networks; Information Management; Military Operations

20070012911 Space and Naval Warfare Systems Center, San Diego, CA USA

Sensor Ontology Integration for the Knowledge Management for Distributed-Tracking (KMDT) Program

Ceruti, Marion G; Wilcox, Dwight R; Jun 2006; 41 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463094; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463094>

This paper describes Knowledge Management for Distributed-Tracking (KMDT), which is an ongoing research and development project to explore methods to improve military functions in the battle space, such as command, control, and decision support. It features a hypothetical use-case scenario that shows how knowledge-management technologies, such as ontologies and intelligent agents, can be used to improve battle-space awareness and the decision-making process in command centers with respect to distributed tracking and threat identification of platforms. The KMDT sensor ontology is based partly on concepts described in the MIL-STD-2525B and STANAG 4420 specifications, which define symbology to represent level-one data-fusion information, such as the classification of platforms and targets in the battle space. The paper includes a discussion of ontology-integration examples of this with this symbology as it relates to fusion and tracking.

DTIC

Information Management; Military Operations

20070012921 Air Force Research Lab., Mesa, AZ USA

Developing Expertise at the Operational-Level of Warfare

Tossell, Chad; Garrity, Michael J; Gildea, Kevin M; Jun 2006; 43 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463110; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463110>

Though the Joint Force Air Component Commander (JFACC) is the senior leader responsible for planning, coordinating, and directing all theater air operations, there is a lack of systematic training at the operational-level of war. General John P. Jumper, Air Force Chief of Staff (CSAF), said of Kosovo: ‘LGen Michael Short, JFACC of Operation Allied Force, trained himself in the operational level of warfare... [Most of us in Air Force leadership] trained ourselves, because our system did not.’ (Tirpak, 2000). Below we describe a unique functional work analysis completed for the JFACC position to begin to specify training requirements and associated gaps. In addition, key experiences were identified that enable the development of proficiency in the requisite knowledge, skills, and abilities. Finally, we conclude with a discussion of how simulation-based technologies can be leveraged to provide these experiences in a way that drives training at the operational-level of warfighting and decision-making vice staff functions or tactical-level processes.

DTIC

Education; Leadership; Warfare

20070012928 Space and Naval Warfare Systems Command, San Diego, CA USA

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions

Galdorisi, George; Goshorn, Rebekah; Jun 2006; 26 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463128; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463128>

We will not win the Global War on Terrorism if we cannot tell the bad guys from the good guys. We have to develop the capability to do that. This statement, made by former CNO Admiral Vern Clark in December 2004, sums up the essence of where maritime domain awareness (MDA) fits in the continuum of the quest for international maritime security. Simply put, without adequate MDA, the ability to enhance maritime security and win the global war on terrorism (GWOT) will remain elusive. This challenge has been addressed at the international policy level by the United Nations and by the International Maritime Organization. At the national level, the USA Government has addressed this challenge in a number of policy documents, most importantly, the National Strategy for Maritime Security and The National Plan to Improve Maritime Domain Awareness. While the policy imperatives of achieving MDA are strong and straightforward and while the concept of operations to put this into effect is already evolving, the technical challenges to achieving the requisite degree of MDA to pursue the GWOT and defend the U.S. Homeland are significant, primarily because MDA is such a broad and comprehensive subject. Compounding the challenge is the fact that operator’s typically view MDA through the lens of collection, fusion/analysis, display/dissemination, and action, or, put another way, with specific attention to data; data mining, data fusion, and data display. While this operational paradigm is useful from a practitioner’s point of view, these requirements don’t easily map to technical capabilities.

DTIC

Information Retrieval; International Relations; Multisensor Fusion; Security; Terrorism; Warfare

20070012929 Space and Naval Warfare Systems Command, San Diego, CA USA

Maintaining Situational Awareness in Large, Complex Organizations

Carreno, Jose; Galdorisi, George; Goshorn, Rebekah; Jun 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463133; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463133>

Maintaining situational and strategic awareness requires constant monitoring of information. Leaders often employ analysts to translate data into information. Today, with a plethora of sources of information, analysts must deal with information overload, a topic of much current discussion. Data mining, using technology to extrapolate patterns from data to direct an analyst to conduct more focused research, constitutes one solution. Another solution, gaining popularity in the business sector, is environmental scanning. Environmental scanning identifies, collects, translates and applies information about external events that influence an organization's strategic landscape. Moreover, relying on technology to analyze data is not always an option; so for effective solutions, human analysts must remain paramount. As such, to comprehend its external environment an organization should establish and maintain a collaborative group tasked to provide situational awareness to its leadership. This paper describes how to design such a dedicated collaborative team by focusing on the role that the Decision Support Group (DSG) plays at the Space and Naval Warfare Systems Center in San Diego (SSC San Diego). The DSG developed a customized process to transform data to information to knowledge and ultimately to understanding - through monthly environmental scans. Specific categories in the environmental scan facilitate this process; this paper will explore in greater detail the category of technology to describe how data is collected and information communicated. Analyzing the DSG's process provides insight into how information is disseminated in a military facility focused in science and engineering research, and demonstrate its wide-scale applications beyond the military, including other science and technology entities, industry and academia.

DTIC

Command and Control; Decision Support Systems; Organizations; Situational Awareness

20070012931 Charles River Analytics, Inc., Cambridge, MA USA

The Role of Meta-Information in C2 Decision-Support Systems

Pfautz, Jonathan; Roth, Emilie; Bisantz, Ann; Thomas-Meyers, Gina; Llinas, James; Fouse, Adam; Jun 2006; 41 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8650-04-M-6418; FA8650-04-D-6549

Report No.(s): AD-A463148; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463148>

Command and control (C2) in complex, dynamic, high-risk warfighting environments is clearly challenging, particularly because of the increasing complexity of available technology for processing and presenting information. Commanders need to understand and act on large volumes of information from a variety of sources and are particularly challenged by the need to reason about the qualifiers of that information, which we will refer to as meta-information (e.g., uncertainty, recency, pedigree). We have explored the role of meta-information in C2 using Cognitive Task Analysis (CTA) techniques to identify when and how, in current practice, human interaction with meta-information impacts decision-making, especially when that decision-making is supported by automation. Too often critical meta-information is not processed, ineffectively displayed, or not displayed at all in existing C2 decision support systems. The result of our analyses is a number of design recommendations for C2 decision-support systems and guidelines for identifying and recognizing the need for meta-information processing and display. In this paper, we present the results of our analyses and discuss their implications with respect to the design of human-system interfaces and the development of computational information processing methods.

DTIC

Command and Control; Data Processing; Decision Support Systems; Human-Computer Interface; Information

20070012940 DSTL Knowledge Services, Glasgow, UK

Representing the Human Decision Maker in Combat Identification

Dean, David F; Handley, Anneliese; Jun 2006; 53 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463172; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463172>

The ability to correctly identify entities encountered on the battlespace is a critical aspect of warfare. When Combat ID is of poor quality, the consequences of fratricide and missed opportunity can have a severe impact on mission effectiveness. Dstl have created the Integrative Combat Identification Entity Relationship (INCIDER) model which has captured the Human, Operational and Physical parameters and relationships that impact upon the decision making processes associated with Combat ID. A demonstration version of INCIDER, which undertakes stochastic parametric simulation of a single entity on entity encounter, has been developed and shown to successfully capture the required aspects of system and human behaviour within an operational context. This paper will discuss the historical problems with Combat ID, and describe typical identification processes. It will then describe the INCIDER parameters and relationships, and how the INCIDER

demonstration model represents the Combat ID process. Finally the paper will discuss use and exploitation of INCIDER.
DTIC

Combat; Decision Making; Simulation

20070012961 Army Research Lab., Aberdeen Proving Ground, MD USA

Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance

Krausman, Andrea S; Pettitt, Rodger A; Elliott, Linda R; Jun 2006; 51 pp.; In English; Original contains color illustrations
Report No.(s): AD-A463289; No Copyright; Avail.: CASI: [A04](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463289>

Future U.S. infantry capabilities, coupled with network-centric warfare concepts, will enable advancements in information distribution and display, and will provide a combat advantage. However, the distribution of large amounts of information, especially to the visual channel may result in information bottlenecks and cognitive overload. Utilizing other human senses such as audition and touch to convey information may help Soldiers manage information, thereby enhancing their performance on the battlefield. In this paper, we describe two studies focused on identifying techniques that aid information management and enhance situational awareness and decision making for operators of future Army Combat systems, specifically, the platoon leader in the infantry command and control vehicle. The first study examined the effects of unimodal alerts on platoon leader decision making and performance. The second study used redundant alerts. This paper emphasizes the background of the research, experimental design, results, and future directions.

DTIC

Combat; Data Acquisition; Decision Making; Display Devices; Organizations

20070012964 Space and Naval Warfare Systems Command, San Diego, CA USA

Towards an Integrated Deployment and Crisis Response Planning System for C2

Ambrosius, Stephen L; Do, Nhu-Nga T; Ferguson, Patrick; Moone, Sean; Bojanowski, Beth; Jun 2006; 29 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463296; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463296>

This paper presents the interim results of work by the Space and Naval Warfare Systems Center San Diego (SPAWAR) to increase the speed of Command and Control (C2) operations in the Naval Force Deployment Planning Process. SPAWAR has fielded a Web-based employment scheduling and deployment planning system for the Navy called WebSked Distributed Services. The Chief of Naval Operations designated it the sole employment scheduling system for the Navy. Work is currently underway to integrate additional aspects of the deployment and crisis response planning processes into this automated architecture and thus increase speed of Command.

DTIC

Deployment; Planning

20070012966 Mitre Corp., Bedford, MA USA

Command Authority & Information Flows in Net-Centric Operations

O'Brien, Linsey; Renner, Scott; Rosenthal, Annie; Scarano, Jay; Jun 2006; 30 pp.; In English

Report No.(s): AD-A463298; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463298>

The DoD net-centric transformation will bring extended reach & flexible capabilities through seamless information sharing. This requires breaking down the stovepiped systems that limit commanders from taking advantage of external information and assets. However, stovepiped systems are not all bad: one side-effect of those arbitrary and rigid barriers is to ensure access only to vetted information by authorized participants. As we take down these old barriers, many new information flows and decision procedures become possible. Some of those possibilities are wrong, and should not be permitted. The question for this paper is: Who decides, and what is required to enforce those decisions? We need new procedures and technical features to ensure that the right information gets to the right people, that all information is protected, and that overall information flow policy is preserved for the enterprise. This paper discusses the impact of net-centric operations on technical architectures and some of the options and capabilities that new technologies can provide.

DTIC

Decision Making; Information Flow; Interoperability

20070012968 Mitre Corp., Bedford, MA USA

Structure Mapping in Visual Displays for Decision Support

Burns, Kevin; Bonaceto, Craig; Jun 2006; 32 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463312; No Copyright; Avail.: CASI: **A03**, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463312>

This paper adopts a cognitive theory of analogy and applies it to the design of decision support systems. The approach, called structure mapping, captures the conceptual structure of a C2 problem in the graphical features of a visual display. The result is a visualization that supports decision making better than standard mappings of geospatial information. As an example we present a system designed to support weapon-target pairing for time-sensitive targeting. This C2 system in particular, and structure mapping in general, are useful because solving a problem like weapon-target pairing requires reasoning about probabilities, priorities and other parameters that are not shown in standard mappings. Thus the contribution of this paper is threefold in: (1) reviewing the theory behind our structure mapping approach; (2) presenting a system designed in accordance with this approach; (3) discussing how the same approach can be used to design intuitively informative displays for other C2 systems.

DTIC

Cognition; Decision Support Systems; Display Devices; Sensitivity; Targets

20070012981 Aptima, Inc., Woburn, MA USA

Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise

Weil, Shawn A; Carley, Kathleen M; Diesner, Jana; Freeman, Jared; Cooke, Nancy J; Jun 2006; 45 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463341; No Copyright; Avail.: CASI: **A03**, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463341>

Network centric warfare promises to increase information sharing and allow distribution of decision making. This will improve military effectiveness, but only if the situational awareness (SA) of warfighters is correctly aligned. Modern natural language processing techniques, such as Network Text Analysis (Carley, 1993), are designed to infer the cognitive states of individuals and groups engaged in cognitive collaboration and measure group SA by exploiting data on the information that team members access and generate. An integrated software application, IMAGES, utilizes AutoMap (Diesner & Carley, 2004) as the primary analysis engine to take advantage of the large amounts of communication and report text that naturally occur in collaborative environments. The text generated in the normal course of work is collected and changed into forms that can be compared and analyzed. A comparison of networks based on text from several individuals or groups yields information about the similarity of their respective mental models. Differences among maps may reflect misalignments of SA, which can be remedied by information sharing and targeted communication. An exercise was conducted to assess the potential of NTA as implemented in AutoMap and IMAGES. The results indicate that NTA will allow analysts to effectively assess SA through passive means.

DTIC

Information Systems; Physical Exercise; Situational Awareness

20070012993 Intelligent Systems Technology, Inc., Santa Monica, CA USA

The Role of Ontology in System-of-Systems Acquisition

Mayk, Israel; Madni, Azad M; Jan 2006; 36 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463386; No Copyright; Avail.: CASI: **A03**, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463386>

This paper addresses the importance of a unified ontology for a Battle Command (BC) system of systems (SoS) acquisition. A BC SoS is a Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance and Target Acquisition (C4ISR&TA) federation of large-scale, net-centric systems that are collaborative and interoperable and include heterogeneous multi-agency managed intelligent agents, humans-in-the-loop, and unmanned autonomous systems. As systems become increasingly complex, modularity becomes the key to reuse, scalability, and an open architecture. In addition, these design features are key to a manageable and affordable transformation from current to future capabilities across acquisition maturity phases over several decades of fielding. A new large-scale SoS cannot be built in isolation. It needs to evolve internally and accommodate external pressures to integrate or be interoperable with current systems of record. The development of a unifying ontology that spans multiple domains in the SoS is shown to be crucial, if not pivotal, to the success

of SoS engineering efforts which are inherently multi-disciplinary and collaborative.

DTIC

Combat; Command and Control

20070012994 Sandia National Labs., Albuquerque, NM USA

Situation Awareness for Cyber Defense

Cumiford, Leslie D; Jan 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DE-ACO4-94AL85000

Report No.(s): AD-A463389; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463389>

Situation awareness (SA), or the ability to assess situations and prepare timely responses, has long been acknowledged as an important aspect of theater operations for defensive purposes. Likewise, SA is critical in the cyber world. The focus of this paper is SA in the cyber domain with respect to defensive capabilities. The cyber defense domain has an important characteristic in common with related domains such as analysis of terrorism, protection of infrastructure, and IED defense: the domains are characterized by sets of complex, interacting issues that are ill-defined, ambiguous, and evolving in time. Solutions for such problems must be integrative, handle domain complexity, and incorporate and address the element of surprise. A list of the capabilities needed to accomplish effective cyber SA is provided, along with an architecture for cyber SA reasoning. Most cyber SA architectures attempt to mirror the complexity of the domain. Surprisingly, the latest brain research does not support this approach. Notional information is provided regarding a new approach to cyber situation awareness, taking into account the lessons learned from the way humans process such information.

DTIC

Cybernetics; Situational Awareness

20070013161 Air Force Research Lab., Rome, NY USA

An Anticipatory Environment Framework

Colenzo, Steve P; McKeever, William E; DeStefano, Chad C; Gilmour, Duane A; Jun 2006; 16 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463196; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In today's volatile world, it is necessary to provide decision makers with every advantage when dealing with a dynamic and changing adversary. Decision makers require a capability that would enable them to anticipate and shape the battlespace, i.e. an anticipatory environment (AE). This capability would lead to more proactive, vice reactive, decision making in future military missions. An AE proof of concept framework has been developed that encompasses the first four phases of the Joint Air Estimate Process (JAEP), as defined in Joint Publication 3-30, 'Command and Control for Joint Air Operations'. The framework provides the foundation to perform mission analysis, situation and course of action (COA) development, COA analysis, COA comparison, and aids in COA selection. This paper presents the tools, technologies and the integration of the necessary capabilities to create an AE. Utilizing a simple scenario, containing friendly and adversary entities, the AE framework will be demonstrated along with a discussion of the results.

DTIC

Decision Making; Predictions

20070013195 Boeing Phantom Works, Saint Louis, MO USA

A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2

Wiebe, Bob; Compton, Dan; Garvey, Dave; Jun 2006; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463276; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In Structure of Scientific Revolutions, Thomas Kuhn states that science usually manifests an essential tension between tradition and innovation. To successfully meet future military challenges, there will be major discontinuities between the Command and Control (C2) concepts. This briefing looks at collaborative and alternative C2 approaches.

DTIC

Command and Control; Synchronism

20070013199 Aptima, Inc., Woburn, MA USA

An Agent-based Approach to Evaluating the Impact of Technologies on C2

Lovell, Stacy; Levchuk, Georgiy; Linegang, Michael; Jun 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463284; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The dynamic nature of hostile, urban environments has resulted in an increased interest in novel command and control (C2) technologies and associated tactics, techniques, and procedures (TTPs). However, the introduction of new technologies to support C2 significantly impacts performance and effectiveness of military forces. The goal of our research was to support the assessment of novel Communications, Command, Control and Intelligence (C3I) technologies that addressed various challenges of Military Operations in Urban Terrain (MOUT). Our novel approach combined the strengths of field assessment with virtual and constructive simulations, which can quantify the effects of technologies and associated TTPs that span a wide range of capabilities; including sensing, situation awareness/command and control (SA/C2), and shaping components. These evaluation capabilities are complemented by support for optimizing TTPs and organizational structure to improve performance across a variety of metrics (e.g. mission completion time, execution tempo, team task load, etc.). Initial assessments were validated by comparing results from field studies and simulations, which confirmed that our approach identified force-multiplying effects of emerging technologies.

DTIC

Command and Control; Optimization; Systems Analysis; Tactics

20070013203 Soar Technology, Inc., Ann Arbor, MI USA

A Framework for Supporting Teamwork between Humans and Autonomous Systems

DeKoven, Elyon; Murphy, Anne K; Jun 2006; 34 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463300; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The US Army's vision of future warfare includes command and control (C2) of multiple manned and uninhabited assets in parallel. Central to this vision are human-robotic teams, in which uninhabited assets and human warfighters operate in a coordinated fashion toward shared objectives. Effective C2 will require user interface controls that allow an operator to integrate all types of elements in these heterogeneous teams in support of effective coordinated tactics and procedures. The Intelligent Control Framework (ICF) project at Soar Technology is exploring issues related to the design and development of operator interfaces for C2 of manned and uninhabited assets. We are presently focused on aspects of teamwork related to collaborative planning. In this context, the ICF architecture forms a communicative substrate for human-system negotiation about task responsibilities and levels of autonomy among assets. This paper describes three tiers of collaboration that need to be supported in such C2 interfaces and the system intelligence required to support those tiers. We describe our implementation of an Adjustable Autonomy Module (AAM) as a partial fulfillment of these reasoning requirements within the ICF system, and use the three tiers to discuss lessons we have learned concerning interaction design to support operator system communication about plans and asset autonomy.

DTIC

Adjusting; Ambiguity; Autonomy; Group Dynamics; Robotics

20070013214 Washington Univ., Seattle, WA USA

Agile and Resilient Hierarchies for Defense Departments: Lofty Ideal or an Actionable Proposal

Desouza, Kevin C; Jun 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463353; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Department of Defense (DoD) must demonstrate agility and resilience in operations at the strategic, tactical, and operational levels. The current Command and Control (C2) structure requires improved management of information and knowledge for agility and resilience at the strategic, tactical, and operational levels. The challenge is to design the organization around the flows of information, or the management of information information-based operations. In order to do this, a comprehensive approach to information management is needed. Agility, while important, is not the only consideration. Completely agile structures may lose the benefits bestowed by hierarchies. Rather the Defense Department should work towards agile and resilient hierarchies that can recover quickly following setbacks.

DTIC

Command and Control; Hierarchies

20070013216 Air Force Research Lab., Rome, NY USA

Testing Agile Information Management Systems with Video Test Client. Case Study - DIMES

Yan, Lok K; Jan 2006; 42 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463359; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In a Network Centric Warfare (NCW) environment, geographically distributed forces are networked together to attain military advantage, e.g. force agility. At the core of NCW is the ability for these distributed forces to collaborate and share

information, which are the two services provided by information management systems located on the Global Information Grid (GIG). Due to the fact that a single system can not be perfect for all possible applications, system architects must sort through the different choices and select the best one for the desired application. In order to do so, designers must be able to understand what the capabilities of the system are in a common language. Quality of Service (QoS) metrics provide one means of describing these capabilities. Like netcentric forces, it is desired that the supporting information management system also be agile. The notion of an agile information management system (AIMS) is introduced and the associated QoS attributes are defined. Video Test Client (VTC) is a QoS test platform that uses audio and video data as the basic unit of information. It is capable of using both pre-recorded and live video, i.e. video telecasting and teleconferencing, streams for testing. Its design and capabilities are also discussed. VTC was used to obtain latency and jitter measurements for the Distributed Information Management Enterprise Service (DIMES), an AIMS under development at the Air Force Research Laboratory, Information Directorate. Preliminary results shows that DIMES introduces 787 microseconds of latency, on average, resulting in a maximum of 190 good quality simultaneous collaboration streams with 20fps audio and 30fps video.

DTIC

Information Management; Management Systems

20070013297 Naval War Coll., Newport, RI USA

Operational Command and Control for Information Operations

Myers, John M; May 17, 2006; 26 pp.; In English

Report No.(s): AD-A463534; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Information Operations (IO) has been a topic of great debate. Much of the discussion has stemmed from the fact no individual commander owns or controls the entire discipline. There have been several reasons for the lack of ownership such as IO supports all warfare areas, its application is an all-hands effort and there have been too few capabilities to command. Over the years, models have been proposed on how to command and control the discipline. Current joint doctrine provides a framework that has IO embedded in the J-3 organization. The doctrine offers a representative IO cell that is led by a J-39 cell chief who resides below the directorate level of authority. Unfortunately current doctrine does not provide adequate guidance for commanding and controlling this discipline. As the demand for IO increases and new capabilities come online, IO needs to be commanded vice coordinated. The traditional component commanders-by-physical domain (e.g., air, land, sea) breaks down in the information age and a new construct to deal with IO and information as weapons should be considered. This paper suggests the responsibility for IO during normal operations should be assigned to a Theater Information Operations Command (TIOC) who is OPCON to the combatant commander. Once a requirement for a Joint Task Force (JTF) has been established, the TIOC is OPCON as the Joint Force Information Operations Component Commander (JFIOCC) to the Commander, JTF.

DTIC

Command and Control; Military Operations

20070013300 Naval War Coll., Newport, RI USA

Optimizing Information Operations for the New Maritime Strategy

Haws, Gregory J; Oct 23, 2006; 21 pp.; In English

Report No.(s): AD-A463554; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Navy's Information Operations force and its capabilities are an important component of the new Maritime Strategy and its objective of meeting the challenges set forth by the Chief of Naval Operations (CNO). However, the Navy's Information Operations architecture requires modifications at the theater-strategic and operational levels of command to optimize its role in the CNO's new Maritime Strategy. Specifically, three areas require improvement: organizational alignment, career force development, and integration and interoperability. To ensure that the Navy's Information Operations are better positioned for the new Maritime Strategy, an echelon two Navy Information Operations command also needs to be established. The organizational power that comes with this level of command will give the Information Operations establishment more leverage within the Navy, and also within the Joint environment. The Navy Information Operations Career Force is making slow progress. The benefits of a strong and dedicated force are apparent, but the pace of educating and training officers must increase, with a focus on the art of Influence Operations and Information Operations Planning. In addition, the capabilities of the Navy's Information Operations force need to be transferable to U.S. allies, partners, and friends to the greatest extent possible. Their improved understanding of the U.S. Navy's Information Operations capabilities will build the stronger alliances and partnerships required for the new Maritime Strategy.

DTIC

Computer Networks; Electronic Warfare; Information Systems; Navy; Optimization; Warfare

20070013306 Naval War Coll., Newport, RI USA

Filtering and Trust as Tools for the Operational Commander in the Information Age

Davis, Alan D; Oct 20, 2006; 27 pp.; In English

Report No.(s): AD-A463567; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Operational commanders leading forces in the information age have unprecedented access to data and can influence tactical activities and decisions with a phone call. Senior commanders are also subjected to immediate feedback from their subordinates, bosses, the media, and their peers. This environment influences everything from the command and control structure to the personal relationships the commander has. An analysis of this environment points to the impact of network centric warfare, information superiority, shared situational awareness, adaptability, and transparency on the commander's decision-making process. This paper identifies filtering and trust as tools that are now more important to successful command in the information age. It defines filtering and trust from both a technical and leadership perspective and uses General Tommy Franks experience in OIF to illustrate how poor filtering and trust can affect mission success. Finally, the paper suggests activities that DOD should consider to improve the leadership skills in senior commanders.

DTIC

Decision Making; Leadership

20070013323 Space and Naval Warfare Systems Command, San Diego, CA USA

Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information

Cowen, Michael B; Fleming, Robert A; Jun 2005; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463603; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Collaborative command and control environments for team decision making and situation assessment are becoming increasingly more distributed in time and space. Shared understanding among team members with regard to the impact, importance, and quality of relevant information items (e.g., sensor outputs, text documents, images, message traffic, web pages) is a critical element in the selection of an effective course of action. Here, we focus on the issues of (1) what is the minimum information that needs to be exchanged for shared understanding to occur, (2) how do we capture that information and (3) how should it best be displayed? Distributed teams that communicate asynchronously require a knowledge management plug-in tool that will convert, encapsulate, and tag a group member's subjective understanding of a complex information item into an iconic representation that represent various information parameters. These icons are referred to as Information Objects (IOBs) and are automatically generated from an abstraction template completed by a team member for each decision-relevant information item. These IOBs can then easily be electronically exchanged among the team, improving shared understanding, consensus building, and information fusion among group members and significantly reducing the valuable decision time typically consumed by conflict resolution.

DTIC

Command and Control; Decision Making; Multisensor Fusion; Plugs

20070013333 State Univ. of New York, Buffalo, NY USA

Information Fusion for Natural and Man-Made Disasters

Scott, Peter D; Jan 31, 2007; 446 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-1-0371; Proj-6609

Report No.(s): AD-A463649; No Copyright; Avail.: CASI: [A19](#), Hardcopy

Prompt effective response to emergencies created by major natural and man-made disasters requires highly coordinated efforts from emergency responders and decision-makers across multiple disciplines, jurisdictions, and hierarchical levels of responsibility and authority. A critical task is creation of coherent, comprehensive and accurate situation assessment which can guide decision-making and resource allocation. The raw materials for this situation assessment are prior domain knowledge, incoming reports from sensors and human observers, a situational assessment logic, and a disciplined data fusion paradigm. To date, data fusion research in this domain has focused on the levels of data fusion below the critical situation assessment level, namely signal and object assessment. This project studies the use of comprehensive data fusion, including situation and impact assessment, in the response to natural and man-made disasters. In particular, the early response phase is emphasized, in which casualty mitigation is the core goal. New methodological approaches and their deployment in an earthquake simulator test bed are the products of this research.

DTIC

Disasters; Emergencies; Management Methods; Multisensor Fusion

20070013348 Naval War Coll., Newport, RI USA

Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations

Schauppner, Craig T; May 16, 2006; 49 pp.; In English

Report No.(s): AD-A463707; No Copyright; Avail.: CASI: [A03](#), Hardcopy

One of the most difficult questions the Combatant Commander must answer while executing Stability, Security, Transition, and Reconstruction (SSTR) operations is, How do we know if our efforts are succeeding? Indeed, DoD Directive 3000.05, Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations specifically tasks the Combatant Commanders to develop measures of effectiveness (MOEs) that evaluate the progress in achieving the goals set forth in the SSTR directive. Yet, given little guidance from senior civilian policy makers and the immense uncertainty surrounding SSTR operations, Combatant Commanders typically rely upon traditional military focused MOEs, which are easily quantifiable and militarily comprehensible. However, these traditional military MOEs fail to accurately assess the progress in SSTR operations because they attempt to answer a fundamentally systemic problem through a systematic approach. Hierarchical Holographic Modeling (HHM) is a risk-based methodology that decomposes a large-scale system into a hierarchy of subsystems and shows a multidimensional, holistic view of [the] system (Dombroski et al. 2002). This paper will demonstrate how HHM can be applied by the Combatant Commander's staff to develop a more accurate assessment of how well our efforts in SSTR operations are succeeding.

DTIC

Hierarchies; Holography; Security; Stability

20070013360 Department of Defense, Fort Meade, MD USA

QACTIS Enhancements in TREC QA-2006

Schone, P; Ciany, G; Cutts, R; McNamee, P; Mayfield, J; Smith, Tom; Jan 2006; 10 pp.; In English

Report No.(s): AD-A463732; No Copyright; Avail.: CASI: [A02](#), Hardcopy

The QACTIS system has been tested in previous years at the TREC Question Answering Evaluations. This paper describes new enhancements to the system specific to TREC-2006, including basic improvements and thresholding experiments, filtered and Internet-supported pseudo-relevance feedback for information retrieval, and emerging statistics-driven question-answering. For contrast, we also compare our TREC-2006 system performance to that of our top systems from TREC-2004 and TREC-2005 applied to this year's data. Lastly, we analyze evaluator-declared unsupportedness of factoids and nugget decisions of 'other' questions to understand major negative changes in performance for these categories over last year.

DTIC

Augmentation; Information Retrieval

20070013362 Mitre Corp., Bedford, MA USA

Analyzing Decisions and Characterizing Information in C2 Systems

Means, C D; Burns, Kevin J; Jun 2005; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463745; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Operators performing C2 functions encounter an ever-increasing amount of information, due to advances in sensors combined with the multiplying effects of Network Centric Warfare. The problem is that information systems are often designed without formal models of how decisions are made or what information is required to make those decisions. In this paper we analyze key decisions in several C2 systems using the methods of Applied Cognitive Work Analysis, and characterize the associated information with respect to three aspects, namely: Dimensionality, Temporality and Uncertainty. The results are used to construct pictures of the information characteristics for decisions within each system, and a composite picture for all three systems. These pictures highlight similarities and differences across systems, and suggest where C2 could be improved by support systems that provide automation and/or visualizations.

DTIC

Command and Control; Decision Making; Information Systems

20070013363 Naval War Coll., Newport, RI USA

Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations

Undersander, Roy C; May 17, 2005; 25 pp.; In English

Report No.(s): AD-A463751; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The USA' National Defense Strategy is a global one. From a military perspective, the USA has come full circle since World War II and is once again relying on coalition partners to bring capability and legitimacy to operations around the world. The USA has made great strides in the last 15 years to improve its support of coalition partners, and to increase their capability with Foreign Military Sales. The perceived interoperability gained by these efforts however, is diminished by the U.S. forces' inability to disclose platform Tactics, Techniques, and Procedures (TTP). The failure to disclose these TTP helps to create a situation of nonstandard operations, engenders a lack of trust, and mitigates unity of effort between coalition partners and the USA. An Aviation Tactics Release/Cross Functional Team (ATR/CFT) would allow the Navy to release tactics to allies at a regional level and it would relieve local pressure on Combatant Commanders (COCOMs) to make rash judgment calls on disclosure questions that arise. The ATR/CFT could easily be scaled to start as a prototype addressing only Naval Aviation issues or it could be expanded quickly to address all three major communities in the Navy. The benefits to the COCOM and/or joint task force/multinational forces commander are many: standardized and controlled disclosure of TTP, increased interoperability between the USA and coalition forces, and ease of planning for exercises and contingency operations. Operational commanders at every level must embrace this concept, support the reengineering of the Navy and other service disclosure processes, and put the disclosure question at the front when developing new lessons learned or TTP.

DTIC

Interoperability; Military Operations; Navy; Tactics

20070013467 Department of the Navy, Washington, DC USA

Castable and High Modulus Acoustic Dampening Material

Ramotowski, Thomas S, Inventor; Feb 22, 2007; 25 pp.; In English; Original contains color illustrations

Report No.(s): AD-D020281; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A dampening material is presented with a carboxy-terminated-butadiene nitrile (CTBN) as a dampening element. The glass transition temperature of the CTBN is generally at room temperature. The material is a two-component system with micro-scale phase segregation. The CTBN is reacted into an epoxy resin at a high temperature- and- cooled to allow the epoxy to react-with a curing agent. A phase segregation occurs - between the epoxy and the CTBN as the epoxy gels/cures. The extent of phase separation in the reaction is controlled by cross-linking and gelling. The rubbery component of CTBN phase segregates and forms discrete, spherical domains. Because the glass transition temperature of the rubbery domains is in the operational temperature range of interest,- the composite is - capable of absorbing acoustic energy. A high modulus allows a larger amount of acoustic energy to enter the composite where it is absorbed by the rubbery CTBN component.

DTIC

Acoustic Emission; Acoustic Properties; Casting; Castings; Curing; Epoxy Resins; Inventions; Patent Applications; Sound Waves

20070013578 Stanford Univ., CA USA

Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two)

MacKinnon, Douglas J; Levitt, Raymond E; Nissen, Mark E; Jun 2006; 43 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463374; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463374>

This paper outlines efforts to model, simulate and ultimately optimize knowledge flows in Edge organizations. We begin by reviewing Phase I research which explored how knowledge inventory flows through organizations, analogously to perishable, physical goods inventory in a supply chain, and uncovered useful insights to clarify current understanding and permit initial quantification of knowledge management impacts on organizational performance. Current Phase II efforts are then described that classify, quantitatively model, and simulate knowledge flows within and among individuals in Edge organizations. Empirical, experimental data on rates of learning and forgetting drawn from the social and cognitive psychology literature provide the basis for defining and modeling agent learning and forgetting micro-behaviors in our POW-ER computational simulation model of organizations. Phase II (micro-level skill acquisition) builds on Phase I (macro-level inventory control) by modeling the trajectories of individual knowledge flows associated with dynamic knowledge inventory increases and decreases. Using this model, we conduct intellectual experiments (using models of idealized work processes and organizations) and emulation experiments (to replicate outcomes of real work processes and organizations) for model refinement and validation. The goal of these experiments is to determine organizationally, contingently optimal knowledge

intervention strategies. Cumulative Phase III efforts are introduced that integrate findings from prior phases to engineer knowledge management solutions in organizations via a Knowledge Chain Management approach.

DTIC

Flow; Information Management; Organizations

20070013610 Massachusetts Univ., Amherst, MA USA

Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks

Metzler, Donald; Strohmman, Trevor; Croft, W B; Jan 2006; 5 pp.; In English

Contract(s)/Grant(s): NSF-CNS-0454018; NSF-CCF-0205575

Report No.(s): AD-A463600; No Copyright; Avail.: CASI: [A01](#), Hardcopy

This report describes the lessons learned using the Indri search system during the 2004-2006 TREC Terabyte Tracks. We provide an overview of Indri, and, for the ad hoc and named page finding tasks, discuss our general approach to the problem, what worked, what did not work, and what could possibly work in the future.

DTIC

Information Retrieval; General Overviews

20070013621 Space and Naval Warfare Systems Command, Charleston, SC USA

Assessing Self Organization and Emergence in C2 Processes

Lenahan, Jack; Charles, Phil; Jun 2006; 41 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463108; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463108>

We are interested in investigating if we can properly assess whether or not emergent and self organizing capabilities will really improve command and control. To this end, the following questions seem paramount: 1. How does one predict that a capability is about to emerge or self organize? 2. How does one know or assess if a newly self organized or emergent capability will be better or worse than the capabilities currently available in a process? 3. What types of knowledge are required to enable agents to be able to exhibit emergent capabilities or self organizing capabilities? The primary conclusions of this research are: 1. That we should develop a rigorous assessment process, capable of predicting and evaluating both emergent and self organizing capabilities. 2. That much more theoretical work and development is necessary to produce emergent and self organizing capabilities which can be relied upon in a military context. 3. Our primary research goal should be to validate how 'Critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties.' 4. That the agents expected to exhibit the self organizational and emergent capabilities must be able to learn and have access to multiple knowledge types.

DTIC

Organizations; Command and Control

20070013648 Government Accountability Office, Washington, DC, USA

Health Information Technology: Early Efforts Initiated but Comprehensive Privacy Approach Needed for National Strategy

Jan. 2007; 57 pp.; In English

Report No.(s): PB2007-106141; GAO-07-238; No Copyright; Avail.: CASI: [A04](#), Hardcopy

The expanding implementation of health information technology (IT) and electronic health information exchange networks raises concerns regarding the extent to which the privacy of individuals electronic health information is protected. In April 2004, President Bush called for the Department of Health and Human Services (HHS) to develop and implement a strategic plan to guide the nationwide implementation of health IT. The plan is to recommend methods to ensure the privacy of electronic health information. GAO was asked to describe HHSs efforts to ensure privacy as part of its national strategy and to identify challenges associated with protecting electronic personal health information. To do this, GAO assessed relevant HHS privacy-related initiatives and analyzed information from health information organizations. GAO recommends that HHS define and implement an overall privacy approach that identifies milestones for integrating the outcomes of its initiatives, ensures that key privacy principles are fully addressed, and addresses challenges associated with the nationwide exchange of health information. In its comments, HHS disagreed and stated that it has established a comprehensive privacy approach. However, GAO believes that an overall approach for integrating HHSs initiatives has not been fully defined and implemented.

NTIS

Health; Information Systems; Privacy

20070013671 Naval War Coll., Newport, RI USA

Information Operations: A Conceptual Perspective for Staff Organization and Force Employment

Nitzschke, Stephen G; May 17, 2005; 25 pp.; In English

Report No.(s): AD-A463228; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The Joint Force Commander (JFC) lacks an adequate information operations (IO) conceptual framework. Current definitions derived from various service perspectives have hampered his ability to effectively implement an IO strategy in an efficient manner. A different IO conceptual framework, when combined with appropriate definitions, will allow the JFC to more effectively and efficiently organize and employ forces to accomplish IO objectives. This paper suggests a different perspective that recognizes all military capabilities as potential contributors to an IO strategy, and recommends appropriate definitions to help redefine the traditional roles of the information operations and information warfare officers. The new conceptual framework improves effectiveness by allowing the JFC to employ any military activity or capability in an IO strategy specifically focused on the unique decision space of friendly and adversary forces. Efficiency is obtained through a staff organization that reflects this reality. The IO officer becomes a special advisor to the commanding officer, with expertise in integrating military actions and activities to shape the decision space. His staff is augmented based on JFC mission objectives and associated priorities. The information warfare (IW) officer is a warfare specialist capable of fighting in the information domain. He can function within an IO cell or support other battlespace activities as a member of the operations staff.

DTIC

Warfare; Information Theory; Organizations; Military Operations; Psychology

20070013676 ICF Kaiser Engineers, Inc., Fairfax, VA USA

U.S. Army Environmental Center. Fort Dix Community Relations Plan

Kipp, M; Apr 1994; 46 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAA15-91-D-0014-0007

Report No.(s): AD-A463624; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The USA Army Environmental Center (USAEC) has tasked ICF Kaiser Engineers to conduct an Environmental Investigation/Alternative Analysis (EI/AA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This plan, the Community Relations Plan, sets forth a site-specific program to establish communication and information exchange between Fort Dix and the civilian work force; the Army; and various federal, state of New Jersey, Burlington County, Ocean County, community agencies, and the public.

DTIC

Public Relations; Armed Forces (United States); Regulations

20070013678 Communibuild Technologies, Centreville, VA USA

Human Interface to Netcentricity

Dickover, Noel; Sadauskas, Leonard; Jun 2006; 40 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463698; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Successful net-centric operations in theatre have stimulated interest in the application of net-centricity to the Department's support organizations. In this paper we draw parallels between the warfighter's limited achievement of decision superiority and self-synchronization, and our business community's need for decision superiority and self-organization; net-centricity expanded tooth to tail. We recognize however, that the movement towards an expanded net-centric environment has implications to the Department's overall organizational culture and patterns of interaction. The development of a complex information infrastructure without adequate focus on both cultural and socio-technical issues will likely result in significantly lower return on our investment. Of concern are a number of key areas including ad-hoc COI formation, the usability of interface designs, and the impact of culture on measuring progress towards a net-centric environment. More importantly, we conclude that ubiquitous information sharing is not likely to be achieved without a transformation to a trusting, transparent culture. This paper examines these issues and based on recent research results, provides suggestions for future direction.

DTIC

Organizations; Neural Nets

20070013738 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer

Darden, C.; Burks, J.; Jedlovec, G.; Haines, S.; [2007]; 1 pp.; In English; 87th Annual Meeting/AMS, 14-18 Jan. 2007, San Antonio, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

The collocation of a National Weather Service (NWS) Forecast Office with atmospheric scientists from NASA/Marshall Space Flight Center (MSFC) in Huntsville, Alabama has afforded a unique opportunity for science sharing and technology transfer. Specifically, the NWS office in Huntsville has interacted closely with research scientists within the SPORT (Short-term Prediction and Research and Transition) Center at MSFC. One significant technology transfer that has reaped dividends is the transition of unique NASA EOS polar orbiting datasets into NWS field operations. NWS forecasters primarily rely on the AWIPS (Advanced Weather Information and Processing System) decision support system for their day to day forecast and warning decision making. Unfortunately, the transition of data from operational polar orbiters or low inclination orbiting satellites into AWIPS has been relatively slow due to a variety of reasons. The ability to integrate these high resolution NASA datasets into operations has yielded several benefits. The MODIS (MODerate-resolution Imaging Spectrometer) instrument flying on the Aqua and Terra satellites provides a broad spectrum of multispectral observations at resolutions as fine as 250m. Forecasters routinely utilize these datasets to locate fine lines, boundaries, smoke plumes, locations of fog or haze fields, and other mesoscale features. In addition, these important datasets have been transitioned to other WFOs for a variety of local uses. For instance, WFO Great Falls Montana utilizes the MODIS snow cover product for hydrologic planning purposes while several coastal offices utilize the output from the MODIS and AMSR-E instruments to supplement observations in the data sparse regions of the Gulf of Mexico and western Atlantic. In the short term, these datasets have benefited local WFOs in a variety of ways. In the longer term, the process by which these unique datasets were successfully transitioned to operations will benefit the planning and implementation of products and datasets derived from both NPP and NPOESS. This presentation will provide a brief overview of current WFO usage of satellite data, the transition of datasets between SPORT and the N W S , and lessons learned for future transition efforts.

Author

Technology Transfer; Information Systems; Collocation; MODIS (Radiometry); Imaging Spectrometers; Decision Support Systems; Predictions; Forecasting

88

SPACE SCIENCES (GENERAL)

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through 193*.

20070011432 NASA Ames Research Center, Moffett Field, CA, USA

The Birth of Planetary Systems

Lissaur, Jack L.; September 16, 1997; 1 pp.; In English

Contract(s)/Grant(s): RTOP 344-30-50-01; No Copyright; Avail.: Other Sources; Abstract Only

An overview of current theories of star and planet formation is presented. These models are based upon observations of the Solar System and of young stars and their environments. They predict that rocky planets should form around most single stars, although it is possible that in some cases such planets are lost to orbital decay within the protoplanetary disk. The frequency of formation of gas giant planets is more difficult to predict theoretically. Terrestrial planets are believed to grow via pairwise accretion until the spacing of planetary orbits becomes large enough that the configuration is stable for the age of the system. Giant planets begin their growth like terrestrial planets, but they become massive enough that they are able to accumulate substantial amounts of gas before the protoplanetary disk dissipates.

Author

Planetary Evolution; Protoplanetary Disks; Star Formation; Stellar Evolution; Solar System Evolution; Cosmology

20070011489 NASA Johnson Space Center, Houston, TX, USA

Summary of the Science performed onboard the International Space Station during Increments 12 and 13

Jules, Kenol; [2007]; 1 pp.; In English; 58th International Astronautical Congress, 24-28 Sep. 2007, Hyderabad, India; No Copyright; Avail.: Other Sources; Abstract Only

By September of 2007, continuous human presence on the International Space Station will reach a milestone of eighty months. The many astronauts and cosmonauts, who live onboard the station during the last fourteen Increments over that time span, spend their time building the station as well as performing science on a daily basis. Over those eighty months, the U.S astronauts crew members logged over 2954 hours of research time. Far more research time has been accumulated by experiments controlled by investigators on the ground. The U.S astronauts conducted over one hundred and twenty six (126) science investigations. From these hundred and twenty six science investigations, many were operated across multiple Increments. The crew also installed, activated and operated nine (9) science racks that supported six science disciplines

ranging from material sciences to life science. By the end of Increment 14, a total of 5083 kg of research rack mass were ferried to the station as well as 5021 kg of research mass. The objectives of this paper are three-fold. (1) To briefly review the science conducted on the International Space Station during the previous eleven Increments; (2) to discuss in detail the science investigations that were conducted on the station during Increments 12 and 13. The discussion will focus mainly on the primary objectives of each investigation and their associated hypotheses that were investigated during these two Increments. Also, some preliminary science results will be discussed for each of the investigation as science results availability permit. (3) The paper will briefly touch on what the science complement planning was and what was actually accomplished due to real time science implementation and challenges during these two Increments in question to illustrate the challenges of daily science activity while the science platform is under construction. Finally, the paper will briefly discuss the science research complements for the other two Increments, Increments 14 and 15, to preview how much science might be accomplished during these two Increments.

Author

International Space Station; Life Sciences; Flight Crews; Real Time Operation

20070011492 NASA Johnson Space Center, Houston, TX, USA

International Cooperation in the Field of International Space Station (ISS) Payload Safety

Heimann, Timothy; Larsen, Axel M.; Rose, Summer; Sgobba, Tommaso; [2005]; 1 pp.; In English; First IAASS Conference, 25-27 Oct. 2005, Nice, France; Copyright; Avail.: Other Sources; Abstract Only

In the frame of the International Space Station (ISS) Program cooperation, in 1998, the European Space Agency (ESA) approached the National Aeronautics and Space Administration (NASA) with the unique concept of a Payload Safety Review Panel (PSRP) 'franchise' based at the European Space Technology Center (ESTEC), where the panel would be capable of autonomously reviewing flight hardware for safety. This paper will recount the course of an ambitious idea as it progressed into a fully functional reality. It will show how a panel initially conceived at NASA to serve a national programme has evolved into an international safety cooperation asset. The PSRP established at NASA began reviewing ISS payloads approximately in late 1994 or early 1995 as an expansion of the pre-existing Shuttle Program PSRP. This paper briefly describes the fundamental Shuttle safety process and the establishment of the safety requirements for payloads intending to use the Space Transportation System and International Space Station (ISS). The paper will also offer some historical statistics about the experiments that completed the payload safety process for Shuttle and ISS. The paper then presents the background of ISS agreements and international treaties that had to be taken into account when establishing the ESA PSRP. The detailed franchising model will be expounded upon, followed by an outline of the cooperation charter approved by the NASA Associate Administrator, Office of Space Flight, and ESA Director of Manned Spaceflight and Microgravity. The resulting ESA PSRP implementation and its success statistics to date will then be addressed. Additionally the paper presents the ongoing developments with the Japan Aerospace Exploration Agency. The discussion will conclude with ideas for future developments, such to achieve a fully integrated international system of payload safety panels for ISS.

Author

International Space Station; Payloads; Safety Factors; Aerospace Safety; European Space Agency; International Cooperation; NASA Programs

20070011731 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The Cassini-Huygens Sequence Development Process

Long, Jennifer H.; Heventhal, William M., III; Javidnia, Shahram; June 19, 2006; 11 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39847>

Each phase of the sequence development process had to overcome many operational challenges due to the immense complexity of the spacecraft, tour design, pointing capabilities, flight rules and software development. This paper will address the specific challenges related to each of those complexities and the methods used to overcome them during operation.

Author

Cassini Mission; Flight Rules; Computer Programming; Software Engineering; Sequencing

20070011735 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The NASA Orbiting Carbon Observatory

Crisp, David; May 29, 2006; 15 pp.; In English; GOSAT Symposium, 29 May 2006, Tokyo, Japan; Original contains color illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39824>

Accurate forecasting of future climate requires an improved understanding of the global carbon cycle and its interaction with the Earth System OCO and GOSAT will make the first space-based measurements of CO₂ with the accuracy needed to quantify sources and sinks of this important greenhouse gas. Continuing Cooperation between the OCO and GOSAT teams will improve the value of both missions to the science community.

Derived from text

Carbon Dioxide; Climate Change; Carbon Cycle; Greenhouse Effect; Remote Sensing; Forecasting

20070011736 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The Orbiting Carbon Observatory: Mission Overview

Crisp, David; May 30, 2006; 18 pp.; In English; 3rd International Workshop on Greenhouse Gas Measurements from Space, 30-31 May 2006, Tsukuba, Japan; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39823>

OCO will acquire the space-based data needed to identify CO₂ sources and sinks and quantify their variability over the seasonal cycle. Approach: a) Collect spatially resolved, high resolution spectroscopic observations of CO₂ and O₂ absorption in reflected sunlight; b) Use these data to resolve spatial and temporal variations in the column averaged CO₂ dry air mole fraction, X_{CO2} (over the sunlit hemisphere; and c) Employ independent calibration and validation approaches to produce X_{CO2} estimates with random errors and biases no larger than 1-2 ppm (0.3-0.5%) on regional scales at monthly intervals.

Derived from text

Carbon Dioxide; Oxygen; Temporal Distribution; Spatial Distribution; Sunlight; High Resolution

20070011761 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process

Mishkin, Andrew H.; Laubach, Sharon; June 19, 2006; 9 pp.; In English; AIAA SpaceOps Conference, 16-24 Jun. 2006, Rome, Italy; Original contains color illustrations

Report No.(s): Rept-58994; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39820>

To support a 90-day surface mission for two robotic rovers, the Mars Exploration Rover mission designed and implemented an intensive tactical operations process, enabling daily commanding of each rover. Using a combination of new processes, custom software tools, a Mars-time staffing schedule, and seven-day-a-week operations, the MER team was able to compress the traditional weeks-long command-turnaround for a deep space robotic mission to about 18 hours. However, the pace of this process was never intended to be continued indefinitely. Even before the end of the three-month prime mission, MER operations began evolving towards greater sustainability. A combination of continued software tool development, increasing team experience, and availability of reusable sequences first reduced the mean process duration to approximately 11 hours. The number of workshifts required to perform the process dropped, and the team returned to a modified 'Earth-time' schedule. Additional process and tool adaptation eventually provided the option of planning multiple Martian days of activity within a single workshift, making 5-day-a-week operations possible. The vast majority of the science team returned to their home institutions, continuing to participate fully in the tactical operations process remotely. MER has continued to operate for over two Earth-years as many of its key personnel have moved on to other projects, the operations team and budget have shrunk, and the rovers have begun to exhibit symptoms of aging.

Author

Roving Vehicles; Mars Exploration; Software Engineering; Robotics; Computer Programming; Space Missions; Sequencing; Uplinking

20070011768 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The Cassini-Huygens Mission Overview

Vandermeij, Nancy; Paczkowski, Brian G.; June 19, 2006; 9 pp.; In English; AIAA 9th International Conference on Space Operations (SpaceOps), 19-24 Jun. 2006, Rome, Italy; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39848>

The Cassini-Huygens Program is an international science mission to the Saturnian system. Three space agencies and seventeen nations contributed to building the Cassini spacecraft and Huygens probe. The Cassini orbiter is managed and

operated by NASA's Jet Propulsion Laboratory. The Huygens probe was built and operated by the European Space Agency. The mission design for Cassini-Huygens calls for a four-year orbital survey of Saturn, its rings, magnetosphere, and satellites, and the descent into Titan's atmosphere of the Huygens probe. The Cassini orbiter tour consists of 76 orbits around Saturn with 45 close Titan flybys and 8 targeted icy satellite flybys. The Cassini orbiter spacecraft carries twelve scientific instruments that are performing a wide range of observations on a multitude of designated targets. The Huygens probe carried six additional instruments that provided in-situ sampling of the atmosphere and surface of Titan. The multi-national nature of this mission poses significant challenges in the area of flight operations. This paper will provide an overview of the mission, spacecraft, organization and flight operations environment used for the Cassini-Huygens Mission. It will address the operational complexities of the spacecraft and the science instruments and the approach used by Cassini-Huygens to address these issues.

Author

Cassini Mission; Mission Planning; Flight Operations; Huygens Probe; Space Probes; Saturn (Planet)

20070012358 Massachusetts Inst. of Tech., Cambridge, MA, USA

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections

Liu, Y.; Richardson, J. D.; Belcher, J. W.; Kasper, J. C.; Elliott, H. A.; Journal of Geophysical Research; [2006]; Volume 111; 1 pp.; In English

Contract(s)/Grant(s): NNG05GB44G

Report No.(s): A011102; Copyright; Avail.: Other Sources; Abstract Only

ONLINE: <http://dx.doi.org/10.1029/2005JA011329>

We investigate the thermodynamic structure of interplanetary coronal mass ejections (ICMEs) using combined surveys of the ejecta between 0.3 and 20 AU. ICMEs are shown to have a moderate expansion in the solar wind compared with theoretical predictions. The expansion seems to be governed by a polytrope with γ approx. 1.3 in this distance range. We find that Coulomb collisions are important contributors to the ion-ion equilibration process in the ICME plasma. The alpha-proton differential speed quickly drops to below 10 km/s due to strong Coulomb collisions. However, the two species of particles are far from thermal equilibrium with a temperature ratio $T(\text{sub } \alpha)/T(\text{sub } p) = 4-6$, suggestive of a preferential heating of alpha particles. The plasma heating rate as a function of heliocentric distance required for the temperature profile is deduced by taking into account the expansion and energy transfer between protons and alphas via Coulomb collisions. The turbulence dissipation rate is also inferred from the inertial range power spectrum of magnetic fluctuations within ICMEs. Comparison of the turbulence dissipation rate with the required heating rate shows that turbulence dissipation seems sufficient to explain the ICME heating. Sources powering the turbulence are also investigated by examining the instabilities induced by temperature anisotropies and energy deposition by pickup ions.

Author

Thermodynamic Equilibrium; Coronal Mass Ejection; Coulomb Collisions; Temperature Profiles; Polytropic Processes; Plasma Heating; Energy Transfer

20070013717 NASA Marshall Space Flight Center, Huntsville, AL, USA

Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies

Abyzov, S. S.; Duxbury, N. S.; Bobin, N. E.; Fukuchi, M.; Hoover, R. B.; Kanda, H.; Mitskevich, I. N.; Mulyukin, A. L.; Naganuma, T.; Poglazova, M. N.; Ivanov, M. V.; [2007]; 12 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

Successful missions to Mars, Europe and other bodies of the Solar system have created a prerequisite to search for extraterrestrial life. The first attempts of microbial life detection on the Martian surface by the Viking landed missions gave no biological results. Microbiological investigations of the Martian subsurface ground ice layers seem to be more promising. It is well substantiated to consider the Antarctic ice sheet and the Antarctic and Arctic permafrost as terrestrial analogues of Martian habitats. The results of our long-standing microbiological studies of the Antarctic ice would provide the basis for detection of viable microbial cells on Mars. Our microbiological investigations of the deepest and thus most ancient strata of the Antarctic ice sheet for the first time gave evidence for the natural phenomenon of long-term anabiosis (preservation of viability and vitality for millennia years). A combination of classical microbiological methods, epifluorescence microscopy, SEM, TEM, molecular diagnostics, radioisotope labeling and other techniques made it possible for us to obtain convincing proof of the presence of pro- and eukaryotes in the Antarctic ice sheet. In this communication, we will review and discuss some

critical issues related to the detection of viable microorganisms in cold terrestrial environments with regard to future searches for microbial life and/or its biological signatures on extraterrestrial objects.

Author

Extraterrestrial Life; Microbiology; Mars Surface; Antarctic Regions; Arctic Regions; Microorganisms; Mars Missions

89

ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20070011500 Schwegman Lundberg Woessner and Kluth, PA, Minneapolis, MN, USA

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement

McGraw, J. T.; Zimmer, P. C.; Ackermann, M. R.; 20 Dec 04; 23 pp.; In English

Contract(s)/Grant(s): DE-AC04-94AL85000

Patent Info.: Filed 20 Dec 04; US-Patent-Appl-SN-11-016 966

Report No.(s): PB2007-103288; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Apparatus and methods for surface layer atmospheric turbulence differential image motion measurement provide the ability to measure and characterize the atmospheric turbulence in a surface boundary layer with applications to a wide variety of technical areas including, but not limited to, astronomy and atmospheric conditions for take-off and landing at airports. Methods and apparatus include multiple optical sources and a receiver having sub-apertures for detecting light traveling along independent paths from the optical sources to the sub-apertures. The sub-apertures of the receiver are arranged, including relative spacing, to match the geometric arrangement of the multiple optical sources, where there is one sub-aperture for each optical source. Appropriate images received by the sub-apertures are analyzed using differential image motion measurement techniques.

NTIS

Atmospheric Circulation; Atmospheric Turbulence; Flow Measurement; Image Motion Compensation; Surface Layers; Turbulence; Turbulent Flow

20070011631 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Radar Images of Asteroid 100085 (1992 UY4)

Benner, Lance A. M.; Busch, M. W.; Ostro, S. J.; Giorgini, J. D.; Hine, A. A.; Harmon, J. K.; Nolan, M. C.; Rose, R.; Jurgens, R. F.; Jao, J. S.; Magri, C.; Margot, J. -L.; August 14, 2006; 8 pp.; In English; IAU Symposium no. 236, Near-Earth Objects, Our Celestial Neighbors: Opportunities and Risk, 14 Aug. 2006, Prague, Czech Republic; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39808>

No abstract available

Imaging Techniques; Asteroids; Radar Imagery

20070011634 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle

Spilker, Linda J.; Pilorz, S.; Pearl, J.; Cuzzi, J.; Wallis, B.; Ferrari, C.; Brooks, S.; Edgington, S.; Altobelli, N.; Showalter, M.; July 16, 2003; 18 pp.; In English; 36th COSPAR Scientific Assembly, 16-23 Jul. 2006, Beijing, China; Original contains color illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39818>

Radial scans of main rings obtained at a variety of phase angles, local times and ring opening angles. Circular focal plane 1 slowly scanned across rings. Radial resolution approx. 2500 km. Temperatures decrease with increasing phase angle for all main rings. Rough estimate of particle spin period for B ring particle is P \approx 1.8 hours

Derived from text

Cassini Mission; Particle Spin; Saturn Rings; Phase Shift

20070011730 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

NASA's Spitzer Space Telescope's Operational Mission Experience

Wilson, Robert K.; Scott, Charles P.; May 25, 2006; 22 pp.; In English; SPIE Astronomical Telescopes and Instrumentation, 24-31 May 2006, Orlando, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39803>

New Generation of Detector Arrays(100 to 10,000 Gain in Capability over Previous Infrared Space Missions). IRAC: 256 x 256 pixel arrays operating at 3.6 microns, 4.5 microns, 5.8 microns, 8.0 microns. MIPS: Photometer with 3 sets of arrays operating at 24 microns, 70 microns and 160 microns. 128 x 128; 32 x 32 and 2 x 20 arrays. Spectrometer with 50-100 micron capabilities. IRS: 4 Array (128x128 pixel) Spectrograph, 4 -40 microns. Warm Launch Architecture: All other Infrared Missions launched with both the telescope and scientific instrument payload within the cryostat or Dewar. Passive cooling used to cool outer shell to approx.40 K. Cryogenic Boil-off then cools telescope to required 5.5K. Earth Trailing Heliocentric Orbit: Increased observing efficiency, simplification of observation planning, removes earth as heat source.

Derived from text

Spaceborne Telescopes; Cryogenic Equipment; Spectrographs; Space Missions; Infrared Radiation; Cryostats

20070012319 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Interiors of Enceladus and Rhea

Rappaport, N. J.; Iess, L.; Tortora, P.; Lunine, J. I.; Armstrong, J. W.; Asmar, S. W.; Somenzi, L.; Zingoni, F.; May 21, 2006; 29 pp.; In English; American Geophysical Union (AGU), 21 May 2006, Baltimore, MD, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39802>

Measurement method and data set: Gravity field parameters determined by means of range rate measurements over multiple arcs across flyby. Optical imaging not required when reliable a priori estimates of spacecraft state vector are available. Interior of Enceladus: Density of 1605 +/-14 kg/cu m, higher than pre-Cassini estimates, requires a substantial amount of rock to warmer interior to enhance likelihood of differentiation of water from rock-metal. Assume no porosity. Assuming Io s mean density for the rock-metal component, one finds its fractional mass to be 0.52+/-0.06. There is evidence that Enceladus may be differentiated: a) Areas devoid of craters must be geologically young. b) Systems of ridges, fractures, and groove indicate that the surface has been tectonically altered. c) Viscous relaxation of craters has occurred, and d) The plumes near the South pole indicate venting of subsurface volatiles.

Derived from text

Planetary Mass; Enceladus; Rhea (Astronomy); Gravitational Fields; Flyby Missions; Craters; Fractures (Materials); Tectonics

20070012324 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Spitzer Pre Launch Mission Operations System - The Road to Launch

Scott, Charles P.; Wilson, Robert K.; May 24, 2006; 9 pp.; In English; SPIE International Symposium, Astronomical Telescopes and Instrumentation, 24 May 2006, Orlando, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39925>

Spitzer Space Telescope was launched on 25 August 2003 into an Earth-trailing solar orbit to acquire infrared observations from space. Development of the Mission Operations System (MOS) portion prior to launch was very different from planetary missions from the stand point that the MOS teams and Ground Data System had to be ready to support all aspects of the mission at launch (i.e., no cruise period for finalizing the implementation). For Spitzer, all mission-critical events post launch happen in hours or days rather than months or years, as is traditional with deep space missions. At the end of 2000 the Project was dealt a major blow when the Mission Operations System (MOS) had an unsuccessful Critical Design Review (CDR). The project made major changes at the beginning of 2001 in an effort to get the MOS (and Project) back on track. The result for the Spitzer Space Telescope was a successful launch of the observatory followed by an extremely successful In Orbit Checkout (IOC) and operations phase. This paper describes how the project was able to recover the MOS to a successful Delta (CDR) by mid 2001, and what changes in philosophies, experiences, and lessons learned followed. It describes how projects must invest early or else invest heavily later in the development phase to achieve a successful operations phase.

Author

Infrared Astronomy; Space Infrared Telescope Facility; Spacecraft Launching; Space Missions; Design Analysis; Observatories; Data Acquisition

20070012882 Naval Observatory, Washington, DC USA

LISA-The Library and Information Services in Astronomy Conferences

Corbin, Brenda G; Grothkopf, Uta; Jan 2007; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463045; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463045>

In this chapter, we give an overview of the history of LISA meetings and describe their logistics. The topics covered by the conferences and how they have changed over time are reviewed, and we investigate how LISA influences the professional life of astronomy librarians.

DTIC

Astronomy; Conferences; Information Systems; Libraries

20070012886 Naval Observatory, Washington, DC USA

Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems

Raghavan, Deepar; Henry, Todd J; Mason, Brian D; Hambly, Nigel C; Mar 29, 2006; 21 pp.; In English

Contract(s)/Grant(s): NAGW-2166

Report No.(s): AD-A463053; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA463053>

We present results of a reconnaissance for stellar companions to all 131 radial velocity detected candidate extrasolar planetary systems known as of 2005 July 1. Common proper-motion companions were investigated using the multiepoch STScI Digitized Sky Surveys and confirmed by matching the trigonometric parallax distances of the primaries to companion distances estimated photometrically. We also attempt to confirm or refute companions listed in the Washington Double Star Catalog, in the Catalogs of Nearby Stars Series by Gliese and Jahreis, in Hipparcos results, and in Duquennoy & Mayor's radial velocity survey. Our findings indicate that a lower limit of 30 (23%) of the 131 exoplanet systems have stellar companions. We report new stellar companions to HD 38529 and HD 188015 and a new candidate companion to HD 169830. We confirm many previously reported stellar companions, including six stars in five systems, that are recognized for the first time as companions to exoplanet hosts. We have found evidence that 20 entries in the Washington Double Star Catalog are not gravitationally bound companions. At least three (HD 178911, 16 Cyg B, and HD 219449), and possibly five (including HD 41004 and HD 38529), of the exoplanet systems reside in triple-star systems. Three exoplanet systems (GJ86, HD 41004, and gamma Cep) have potentially close-in stellar companions, with planets at roughly Mercury Mars distances from the host star and stellar companions at projected separations of ~20 AU, similar to the Sun Uranus distance. Finally, two of the exoplanet systems contain white dwarf companions. This comprehensive assessment of exoplanet systems indicates that solar systems are found in a variety of stellar multiplicity environments singles, binaries, and triples and that planets survive the post main-sequence evolution of companion stars.

DTIC

Extrasolar Planets; Planets; Solar System; Stellar Atmospheres; Stellar Systems

20070013144 Oxford Univ., Oxford, UK

A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology

Bronder, T J; Nov 14, 2006; 212 pp.; In English

Report No.(s): AD-A462901; CI07-0016; No Copyright; Avail.: CASI: [A10](#), Hardcopy

This thesis presents quantitative analysis of spectra from 130 high-redshift ($Z_{\text{median}} = 0.63$) Type Ia supernovae. This extensive set of distant SNe is comprised of a primary set of objects observed at the Gemini telescopes for the ongoing Supernova Legacy Survey (SNLS), a secondary set observed at the Very Large Telescope for the SNLS, and a tertiary set of high- z spectra from the literature. All work on the reduction and identification of the spectra in the primary data set (including spectra from a total of 124 SNe candidates observed between August 2003 and May 2006) was completed by the author. Rest-frame equivalent width and Call H&K ejection velocity measurements are made on these distant SNe Ia spectra, with methods tailored to the specific considerations of high- z data. The results from this analysis were compared to corresponding measurements from a set of 167 SNe Ia spectra from 24 nearby objects from the literature to investigate the homogeneity of SNe Ia across a wide range of redshifts (0.001 less than or equal to z less than or equal to 1.0). This comparison provides a quantitative indicator for possible evolutionary effects in the population of high- z SNe surveyed for cosmology. A statistical comparison of the spectroscopic features of the high- z SNe and the trends exhibited in the nearby objects finds a less than 2 sigma difference for all of the measurements considered here. These results also indicate that there are no systematic changes due to redshift in this SNe sample. The dependence of SNe Ia spectroscopic properties on host galaxy type is also investigated

and found to be similar for nearby and distant objects. These results are discussed briefly in the context of the physical understanding and cosmological implications of SNe Ia. A new correlation between SNe Ia peak magnitude and the strength of a specific SiII absorption feature (near 4000 Å, measured within +/- 7 days of maximum light) is also presented.

DTIC

Cosmology; Homogeneity; Quantitative Analysis; Spectroscopy; Supernovae

20070013210 Naval Observatory, Washington, DC USA

Very Large Array Plus Pie Town Astrometry of 46 Radio Stars

Boboltz, D A; Fey, A L; Puatua, W K; Zacharias, N; Claussen, M; Johnston, K J; Gaume, R A; Mar 2007; 12 pp.; In English Report No.(s): AD-A463333; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We have used the Very Large Array, linked with the Pie Town Very Long Baseline Array antenna, to determine astrometric positions of 46 radio stars in the International Celestial Reference Frame (ICRF). Positions were obtained in the ICRF directly through phase referencing of the stars to nearby ICRF quasars whose positions are accurate at the 0.25 mas level. Radio star positions are estimated to be accurate at the 10 mas level, with position errors approaching a few milliarcseconds for some of the stars observed. Our measured positions were combined with previous measurements taken from as early as 1978 to obtain proper-motion estimates for all 46 stars with average uncertainties of appr. 1.7 mas yr⁻¹. We compared our radio star positions and proper motions with the Hipparcos Catalogue data and found consistency in the reference frames produced by each data set on the 1 sigma level, with errors of ~ 2.7 mas per axis for the reference frame orientation angles at our mean epoch of 2003.78. No significant spin is found between our radio data frame and the Hipparcos Celestial Reference Frame, with the largest rotation rates of +0.55 and -0.41 mas yr⁻¹ around the x- and z-axes, respectively, with 1 sigma errors of 0.36 mas yr⁻¹. Thus, our results are consistent with a nonrotating Hipparcos frame with respect to the ICRF.

DTIC

Astrometry; Radio Astronomy; Radio Stars; Very Large Array (VLA)

20070013277 Air Force Research Lab., Hanscom AFB, MA USA

Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546

Lisse, C M; Kraemer, K E; Nuth, III, J A; Li, A; Joswiak, D; Jan 2007; 19 pp.; In English; Original contains color illustrations Contract(s)/Grant(s): Proj-1010

Report No.(s): AD-A463494; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Spitzer Infrared Spectrograph observations of the Deep Impact experiment in July 2005 have created a new paradigm for understanding the infrared spectroscopy of primitive solar nebular material -- the ejecta spectrum is the most detailed ever observed in cometary material. Here, we take the composition model for the material excavated from Comet 9P/Tempel 1's interior and successfully apply it to Infrared Space Observatory spectra of material emitted from Comet C/1995 O1 (Hale-Bopp) and the circumstellar material found around the young stellar object HD 100546. Comparison of our results with analyses of the cometary material returned by the Stardust spacecraft from Comet 81P/Wild 2, the in-situ Halley flyby measurements, and the Deep Impact data return provides a fundamental crosscheck for the spectral decomposition models presented here.

DTIC

Comets; Dust; Ejecta; Hale-Bopp Comet

20070013719 NASA Marshall Space Flight Center, Huntsville, AL, USA

On the Prompt Gamma-ray Emission Properties of Short GRBs

Kouveliotou, Chryssa; [2007]; 1 pp.; In English; 209th Meeting of the American Astronomical Society, 5-10 Jan. 2007, Seattle, WA, USA; No Copyright; Avail.: Other Sources; Abstract Only

Short Gamma-Ray Bursts have been identified as a separate class of events with distinct spectral and temporal properties from their long (log₂ seconds) counterparts. Although multi-wavelength transients and their host galaxies had been found for the latter, it was only after the launch of the Swift satellite that short GRB counterparts and hosts were discovered and studied in detail. Currently, over a dozen short events have been detected with less than half having a measured redshift. Since 1991, GRB durations were established using BATSE gamma-ray light-curves; it is becoming, however, gradually evident from the Swift/BAT data, that we now need to fold spectral dependence, in particular prompt gamma-ray emission spectral time lags, into a multi-parameter GRB classification scheme. I will discuss here the properties of the prompt gamma-rays of all

Swift short GRBs, compare them to those detected with BATSE and other missions and comment on the implications of the different subclass population each mission is probing.

Author

Gamma Ray Bursts; Red Shift; Classifications; Gamma Ray Observatory; Spectra

90

ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20070011591 Stanford Univ., Stanford, CA USA

Structure and Dynamics of GRB Jets

Granot, J.; January 2006; 27 pp.; In English

Report No.(s): DE2006-894104; No Copyright; Avail.: National Technical Information Service (NTIS)

There are several lines of evidence which suggest that the relativistic outflows in gamma-ray bursts (GRBs) are collimated into narrow jets. The jet structure has important implications for the true energy release and the event rate of GRBs, and can constrain the mechanism responsible for the acceleration and collimation of the jet. Nevertheless, the jet structure and its dynamics as it sweeps up the external medium and decelerates, are not well understood. In this review I discuss our current understanding of GRB jets, stressing their structure and dynamics.

NTIS

Gamma Ray Bursts; Dynamic Structural Analysis; Relativistic Particles; Jet Flow

20070011624 NASA Johnson Space Center, Houston, TX, USA

Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector

Horz, Friedrich; Westphal, Andrew J.; Gainsforth, Zack; Borg, Janet; Djouadi, Zahia; Bridges, John; Franchi, Ian; Brownlee, Donald E.; Cheng, Andrew F.; Clark, Benton C.; Floss, Christine, et al.; [2007]; 37 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

We report the discovery that impacts in the Stardust cometary collector are not distributed randomly in the collecting media, but appear to be clustered on scales smaller than 10 cm. We also report the discovery of at least two populations of oblique tracks. We evaluated several hypotheses that could explain the observations. No hypothesis was consistent with all the observations, but the preponderance of evidence points toward at least one impact on the central Whipple shield of the spacecraft as the origin of both clustering and low-angle oblique tracks. High-angle oblique tracks unambiguously originate from a non-cometary impact on the spacecraft bus just forward of the collector.

Author

Spatial Distribution; Stardust Mission; Comet Nuclei; Particles; Accumulators; Impact Damage

20070012366 NASA Johnson Space Center, Houston, TX, USA

Organics Captured from Comet Wild 2 by the Stardust Spacecraft

Sandford, Scott A.; Aleon, Jerome; Araki, Tohru; Bajt, Sasa; Baratta, Giuseppe A.; Borg, Janet; Brucato, John R.; Burchell, Mark J.; Busemann, Henner; Butterworth, Anna; Clemett, Simon J.; Cody, George; Colangeli, Luigi; Cooper, George; D'Hendecourt, Louis; Djouadi, Zahia; Dworkin, Jason P.; Ferrini, Gianluca; Fleckenstein, Holger; Flynn, George J.; Franchi, Ian A.; Fries, Mark; Gilles, Mary K.; Glavin, Daniel P.; Gounelle, Matthieu, et al.; [2007]; 34 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): W-7405-eng-48; DE-AC03-76F00098; Copyright; Avail.: CASI: [A03](#), Hardcopy

Organics found in Comet Wild 2 samples show a heterogeneous and unequilibrated distribution in abundance and composition. Some are similar, but not identical, to those in interplanetary dust particles (IDPs) and carbonaceous meteorites. A new class of aromatic-poor organic material is also present. The organics are rich in O and N compared to meteoritic organics. Aromatic compounds are present, but the samples tend to be relatively poorer in aromatics than meteorites and IDPs. D and 15N suggest that some organics have an interstellar/protostellar heritage. While the variable extent of modification of these materials by impact capture is not yet fully constrained, a remarkably diverse suite of organic compounds is present and identifiable within the returned samples.

Author

Organic Compounds; Carbonaceous Meteorites; Comets; Organic Materials; Wild 2 Comet

20070012833 Astrophysikalisches Inst., Potsdam, Germany

Remarks on the New 100-200 Mhz Receiver of the Solar Radio Observatory of the AIP at Trensorf Near Potsdam, Germany

Mann, Gottfried J; Sep 30, 2006; 9 pp.; In English; In German; Original contains color illustrations

Contract(s)/Grant(s): FA8655-04-1-3014

Report No.(s): AD-A462957; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA462957>

This report results from a contract tasking Astrophysical Institute Potsdam as follows: Grantee will upgrade radio spectrometers allow collection of CME signature data in the 693-741 MHz and 316-337 MHz frequency ranges. This data will then be analyzed and compared to CME data from satellite collection systems. Known CME data from the satellite systems will help researchers determine if CME signatures can be detected from radio astronomical methods alone, without having to correlate the data with the satellites (14 to 48 hours after lift off from the corona). In effect, this will allow detection of CMEs 14 to 48 hours more quickly than current methods.

DTIC

Germany; Receivers; Solar Observatories

20070012878 Moscow Engineering Physics Inst., Moscow, Russian Federation

Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors

Khatipov, Sergey A; Sep 2006; 27 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463038; ISTC-2342P; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463038>

Currently, there exist a large number of studies in the stability of the optical properties of materials used on the external surfaces (blankets, thermal control coatings, solar arrays etc.) of spacecraft. All of them, confirm the fact that the factors of the space environment (FSE) exercise a strong influence both on the spectral and the integral optical parameters of the materials. The purpose of the project was a development of the Database (DB) in the electron format DBMS Access2000, including results of investigation of optical properties of external materials for space vehicles (SV) under conditions of SEF. Within the framework of the present project, laboratory testing for materials applied to external surfaces of SV were carried out under the action of UV-radiation, electrons having an energy of 40, 100 and 200 keV, and also protons having an energy of 40, 150, 300 and 500 keV. Testing was performed for the case of separate action of each of the factors mentioned on the material. The maximum level of an exposure dose, which was reached while performing laboratory testing, amounted up to 1 equivalent solar year under conditions of GEO for the UV-radiation. The objects to be investigated were thermal control coatings (8 trade marks), fabrics (6 trade marks), polymeric films (3 trade marks), solar array elements (6 trade marks). The main material characteristics for materials were: integral and spectral coefficients of electromagnetic radiation absorption, reflection and transmission, coefficient of thermal radiation, angular dependency for reflected and transmitted electromagnetic radiation within the plane of beam incidence. The characteristics mentioned were measured before and after a radiation action, and also in the course of radiation action for different values of the dose absorbed. The total volume of the Data Base amounted up to approximately 2600 records, as represented in tabular and graphical form.

DTIC

Aerospace Environments; Data Bases; Optical Materials; Optical Properties

20070012935 National Inst. of Geophysics and Volcanology, Rome, Italy

European Upper Atmosphere Server DIAS - Final Conference/ Abstract

Zolesi, Bruno; Alfonsi, Lucilla; Nardi, Silvia; Pau, Silvia; Pezzopane, Michael; Pietrella, Marco; Proto, Loredana; Jan 10, 2007; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-06-1-5072

Report No.(s): AD-A463160; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463160>

The DIAS (Digital Upper Atmosphere Server) project is a collaborative venture funded by the European Commission eContent Programme. Its objectives are (1) to develop a pan-European network of stations for monitoring the state of the upper atmosphere in real-time, and for collecting historical records of such data, (2) to develop a new digital server for managing and distributing this data, and (3) to develop and promote the generation of new added-value products based on this raw data to Europe and worldwide markets. The DIAS system is considered to be the only European service provider to offer radio propagation services based on European funding, infrastructure and know-how. As DIAS project is approaching the end of the

EC funding, which officially finishes at the end of May 2006, the DIAS system is fully developed and many possibilities for the commercial exploitation of DIAS products and services have been investigated. At this critical point, the DIAS Final Conference was organised as the top DIAS event, aiming to bring together data providers and users from large institutions and companies. The DIAS Final Conference represented a unique opportunity to demonstrate and test all products and services released by DIAS and to express the users needs, opinions and comments, as well as to make direct contact with the most important DIAS potential users. This report summarizes the technical meeting of 18 May and the users' meeting of 19 May.

DTIC
Conferences; Ionospheres; Solar Physics; Upper Atmosphere

20070013634 North Carolina Agricultural and Technical State Univ., Greensboro, NC USA

International Heliophysical Year SCINDA Workshop/Abstract

Kebede, Abebe; Nair, Jyoti; Oct 1, 2006; 35 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8655-06-1-5084

Report No.(s): AD-A463159; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463159>

The first Heliophysical Year International SCINDA Workshop was held at Sal, Cape Verde, during the period of July 10-14, 2006. This 5-day workshop was organized by Air Force Research Laboratory, NC A&T State University, the and Instituto Nacional De Metereologica E Geofisica Republico De Cabo Verde (INMG). Representatives from Nigeria, Ethiopia, Cape-Verde, Cote D Ivoire, Malaysia and Congo Brazzaville participated in the workshop. The overall goals of the workshop were to establish space science expertise and to install Scintillation Network Decision Aid (SCINDA) across Africa following the geomagnetic equator. SCINDA is a real-time, data driven communication outage forecast and alert system developed for the USA Air Force Space Command by the Air Force Research Laboratory (AFRL), Ionospheric Hazards Specification and Forecast Team, Hanscom AFB. Its purpose is to aid in the specification and prediction of satellite communication degradation due to ionospheric scintillation in the equatorial region. Ionospheric disturbances can cause rapid phase and amplitude fluctuations of satellite signals observed at or near the earth's surface; these fluctuations are known as scintillation. The workshop has provided instructions on the deployment, operation and interpretation of data from SCINDA sensors. These instructions were accompanied by talks by the participating scientists, and meal time discussions on how to advance space science research and education in Africa in the future. At the end of the workshop, the participants learned to setup a GPS TEC/scintillation system on-line at their home institution. This report supplies a summary of the contributed talks.

DTIC

Scintillation; Heliosphere; Earth Ionosphere; Sensors; Astrophysics

20070013707 NASA Marshall Space Flight Center, Huntsville, AL, USA

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes

Fuerst, Steven V.; Mizuno, Yosuke; Nishikawa, Ken-Ichi; Wu, Kinwah; [2007]; 1 pp.; In English; Copyright; Avail.:

Other Sources; Abstract Only

We have calculated the emission from relativistic flows in black hole systems using a fully general relativistic radiative transfer, with flow structures obtained by general relativistic magnetohydrodynamic simulations. We consider thermal free-free emission and thermal synchrotron emission. Bright filament-like features are found protruding (visually) from the accretion disk surface, which are enhancements of synchrotron emission when the magnetic field is roughly aligned with the line-of-sight in the co-moving frame. The features move back and forth as the accretion flow evolves, but their visibility and morphology are robust. We propose that variations and location drifts of the features are responsible for certain X-ray quasi-periodic oscillations (QPOs) observed in black-hole X-ray binaries.

Author

Black Holes (Astronomy); Magnetohydrodynamics; Radiative Transfer; Simulation; Relativistic Effects; Accretion Disks

LUNAR AND PLANETARY SCIENCE AND EXPLORATION

Includes planetology; selenology; meteorites; comets; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

20070011617 NASA Johnson Space Center, Houston, TX, USA

Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community

Nakamura-Messenger, K.; Zolensky, M. E.; Bastien, R.; See, T. H.; Warren, J. L.; Beville, T. J.; Cardenas, F.; Vidonic, L. F.; Horz, F.; McNamara, K. M.; Allen, C. C.; Westphal, A. J.; Snead, C.; Ishii, H. A.; Brownlee, D.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Dust particles released from comet 81P/Wild-2 were captured in silica aerogel on-board the STARDUST spacecraft and successfully returned to the Earth on January 15, 2006. STARDUST recovered thousands of particles ranging in size from 1 to 100 micrometers. The analysis of these samples is complicated by the small total mass collected (1 mg), its entrainment in the aerogel collection medium, and the fact that the cometary dust is comprised of submicrometer minerals and carbonaceous material. During the six month Preliminary Examination period, 75 tracks were extracted from the aerogel cells, but only 25 cometary residues were comprehensively studied by an international consortium of 180 scientists who investigated their mineralogy/petrology, organic/inorganic chemistry, optical properties and isotopic compositions. These detailed studies were made possible by sophisticated sample preparation methods developed for the STARDUST mission and by recent major advances in the sensitivity and spatial resolution of analytical instruments.

Author

Dust; Stardust Mission; Wild 2 Comet; Photographs

20070011618 NASA Johnson Space Center, Houston, TX, USA

Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy

Kearsley, A. T.; Ball, A. D.; Wozniakiewicz, P. A.; Graham, G. A.; Burchell, M. J.; Cole, M. J.; Horz, F.; See, T. H.; [2007]; 2 pp.; In English; Lunar and Planetary Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): W-7405-eng-48; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Stardust spacecraft returned the first undoubted samples of cometary dust, with many grains embedded in the silica aerogel collector. Although many tracks contain one or more large terminal particles of a wide range of mineral compositions, there is also abundant material along the track walls. To help interpret the full particle size, structure and mass, both experimental simulation of impact by shots and numerical modeling of the impact process have been attempted. However, all approaches require accurate and precise measurement of impact track size parameters such as length, width and volume of specific portions. To make such measurements is not easy, especially if extensive aerogel fracturing and discoloration has occurred. In this paper we describe the application and limitations of laser confocal imagery for determination of aerogel track parameters, and for the location of particle remains.

Author

Aerogels; Laser Applications; Microscopy; Stardust Mission; Tracking (Position)

20070011619 NASA Johnson Space Center, Houston, TX, USA

Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts

Kearsley, A. T.; Burchell, M. J.; Graham, G. A.; Horz, F.; Wozniakiewicz, P. A.; Cole, M. J.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): W-7405-eng-48; Copyright; Avail.: CASI: [A01](#), Hardcopy

Aluminium foils exposed to impact during the passage of the Stardust spacecraft through the coma of comet Wild 2 have preserved a record of a wide range of dust particle sizes. The encounter velocity and dust incidence direction are well constrained and can be simulated by laboratory shots. A crater size calibration programme based upon buckshot firings of tightly constrained sizes (monodispersive) of glass, polymer and metal beads has yielded a suite of scaling factors for interpretation of the original impacting grain dimensions. We have now extended our study to include recognition of particle density for better matching of crater to impactor diameter. A novel application of stereometric crater shape measurement, using

paired scanning electron microscope (SEM) images has shown that impactors of differing density yield different crater depth/diameter ratios. Comparison of the three-dimensional gross morphology of our experimental craters with those from Stardust reveals that most of the larger Stardust impacts were produced by grains of low internal porosity.

Derived from text

Comets; Craters; Dust; Stardust Mission; Impactors

20070011620 NASA Johnson Space Center, Houston, TX, USA

SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution

Borg, J.; Horz, F.; Bridges, J. C.; Burchell, M. J.; Djouadi, Z.; Floss, C.; Graham, G. A.; Green, S. F.; Heck, P. R.; Hoppe, P.; Huth, J.; Kearsley, A.; Leroux, H.; Marhas, K.; Stadermann, F. J.; Teslich, N.; [2007]; 2 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Aluminium foils were used on Stardust to stabilize the aerogel specimens in the modular collector tray. Part of these foils were fully exposed to the flux of cometary grains emanating from Wild 2. Because the exposed part of these foils had to be harvested before extraction of the aerogel, numerous foil strips some 1.7 mm wide and 13 or 33 mm long were generated during Stardust's Preliminary Examination (PE). These strips are readily accommodated in their entirety in the sample chambers of modern SEMs, thus providing the opportunity to characterize in situ the size distribution and residue composition - employing EDS methods - of statistically more significant numbers of cometary dust particles compared to aerogel, the latter mandating extensive sample preparation. We describe here the analysis of nearly 300 impact craters and their implications for Wild 2 dust.

Derived from text

Aluminum; Stardust Mission; Metal Foils; Craters; Wild 2 Comet; Mineralogy; Scanning Electron Microscopy

20070011739 NASA, Washington, DC, USA

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17

2000; In English

Report No.(s): NASA/SP-2000-4602; No Copyright; Avail.: CASI: [C01](#), CD-ROM

Aboard every U.S. piloted spacecraft, from Mercury through Apollo, NASA installed tape recorders that captured nearly every word spoken by the astronauts during their history-making flights into space. For the first time ever, NASA has digitally scanned all of the transcripts made from both the onboard tapes and those tape recordings made on the ground from the air-to-ground transmissions and placed them on this two CD-ROM set. Gathered in this special collection are 80 transcripts totaling nearly 45,000 pages of text that cover every US human spaceflight from the first human Mercury mission through the last lunar landing flight of Apollo 17. Users of this CD will note that the quantity and type of transcripts made for each mission vary. For example, the Mercury flights each had one transcript whereas the Gemini missions produced several. Starting with the Gemini flights, NASA produced a Public Affairs Office (PAO) commentary version, as well as at least one 'technical' air-to-ground transcript version, per mission. Most of the Apollo missions produced four transcripts per flight. These included the onboard voice data recorder transcripts made from the Data Storage Equipment (DSE) on the Command Module (CM), and the Data Storage Electronics Assembly (DSEA) onboard the Lunar Module (LM), in addition to the PAO commentary and air-to-ground technical transcripts. The CD set includes an index listing each transcript file by name. Some of the transcripts include a detailed explanation of their contents and how they were made. Also included in this collection is a listing of all the original air-to-ground audiotapes housed in NASA's archives from which many of these transcripts were made. We hope you find this collection of transcripts interesting and useful.

Author

Apollo 17 Flight; Space Missions; Manned Space Flight; Mercury Flights; Texts; Audio Tapes; Collection; NASA Space Programs

20070011758 NASA Johnson Space Center, Houston, TX, USA

The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling

Perronnet, M.; Berger, G.; Zolensky, M. E.; Toplis, M. J.; Kolb, V. M.; Bajagic, M.; [2007]; 41 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

CR carbonaceous chondrites are of major interest since they contain some of the most primitive organic matter known. However, aqueous alteration has more or less overprinted their original features in a way that needs to be assessed. This study was initiated by comparing the mineralogy and modal abundances of the most altered CR1 chondrite, GRO 95577, to a less

altered CR2. Calculated element distributions imply that GRO 95577 may result from aqueous alteration of Renazzo by an isochemical process on their parent asteroid, whose mineralogical composition was estimated (Unaltered CR shown included table).

Derived from text

Carbonaceous Chondrites; Geochemistry; Meteoritic Composition

20070013522 NASA Johnson Space Center, Houston, TX, USA

Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model

Fernandez-Remolar, D. C.; Prieto-Ballesteros, O.; Osburn, M. R.; Gomez-Ortiz, D.; Arvidson, R. E.; Morris, R. V.; Ming, D.; Amils, R.; Friendlander, L. R.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA

Contract(s)/Grant(s): Proj. ESP2006-09487; Copyright; Avail.: CASI: [A01](#), Hardcopy

The extensive evidence for sulfate deposits on Mars provided by analyses of MER and Mars Express data shows that the sulfur played an essential role in the geochemical cycles of the planet, including reservoirs in the atmosphere, hydro-sphere and geosphere. Overall the data are consistent with a fluvial/lacustrine-evaporative origin of at least some of the sulfate deposits, with mineral precipitation through oversaturation of salty acidic fluids enriched in sulfates. This scenario requires reservoirs of sulfur and associated cations, as well as an acidic and oxidizing hydrochemistry which could be provided by surface and subsurface catching of meteoric waters resulting in the presence of sulfur-bearing gases and steam photochemistry. In this work we suggest a new scenario for the extensive generation of sulfates in Mars based on the observation of seasonal changes in the redox and pH of subsurface waters enriched in sulfur that supply the acidic Mars process analog of Rio Tinto. This model considers the long-term subsurface storage of sulfur during most of Noachian and its release from the late Noachian to Hesperian time through weathering by meteoric fluids that would acidify and oxidize the sulfur bearing compounds stored in the subsurface.

Author

Geochemistry; Mars Surface; Sulfates; Sulfur; Mars (Planet); Analogs

20070013523 NASA Johnson Space Center, Houston, TX, USA

Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars

Golden, D. C.; Ming, D. W.; Morris, R. V.; Graff, T. G.; [2007]; 2 pp.; In English; Lunar and Planetary Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Athena science payload onboard the Opportunity rover identified hematite-rich spherules (mean diameter of 4.2 +/- 0.8 mm) embedded in outcrops and occurring as lag deposits at Meridiani Planum. They have formed as diagenetic concretions from the rapid breakdown of pre-existing jarosite and other iron sulfates when chemically distinct groundwater passed through the sediments. Diagenetic, Fe-cemented concretions found in the Jurassic Navajo Formation, Utah and hematite-rich spherules found within sulfate-rich volcanic breccia on Mauna Kea volcano, Hawaii are possible terrestrial analogues for Meridiani spherules. The Navajo Formation concretions form in porous quartz arenite from the dissolution of iron oxides by reducing fluids and subsequent Fe precipitation to form spherical Fe- and Si-rich concretions. The Mauna Kea spherules form by hydrothermal, acid-sulfate alteration of basaltic tephra. The formation of hematite-rich spherules with similar chemical, mineralogical, and morphological properties to the Meridiani spherules is rare on Earth, so little is known about their formation conditions. In this study, we have synthesized in the laboratory hematite-rich spherules that are analogous in nearly all respects to the Meridiani spherules.

Author

Geochemistry; Hematite; Mars Surface; Mineralogy; Morphology; Spherules

20070013531 NASA Johnson Space Center, Houston, TX, USA

Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater

Yen, A. S.; Morris, Richard V.; Gellert, R.; Clark, B. C.; Ming, Douglas W.; Klingelhofer, G.; McCoy, T. J.; Schmidt, M. E.; [2007]; 2 pp.; In English; Lunar and Planetary Science Conference, 12-16 Mar. 2007, Houston, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Light-toned, subsurface soil deposits have been excavated by the Mars Exploration Rover (MER) Spirit in six distinct locations along its traverse across the Columbia Hills of Gusev Crater. Samples at two of these sites have been analyzed in detail by the Mossbauer (MB) and Alpha Particle X-ray Spectrometers (APXS), providing information on iron mineralogy and

elemental chemistry, respectively. These soils are referred to as 'Paso Robles' class deposits.

Author

Mars Exploration; Mineralogy; Mars Surface; Mars (Planet); Mars Surface Samples; Geochemistry

20070013543 NASA Johnson Space Center, Houston, TX, USA

The International Space Station: Stepping-stone to Exploration

Gerstenmaier, William H.; Kitmacher, Gary H.; Kelly, Brian K.; [2005]; 1 pp.; In English; 2005 International Astronautical Congress, 17-21 Oct. 2005, Fukuoka, Japan; No Copyright; Avail.: Other Sources; Abstract Only

As the Space Shuttle returns to flight this year, major reconfiguration and assembly of the International Space Station continues as the USA and our 5 International Partners resume building and carry on operating this impressive Earth-orbiting research facility. In his January 14, 2004, speech announcing a new vision for America's space program, President Bush ratified the USA commitment to completing construction of the ISS by 2010. The current ongoing research aboard the Station on the long-term effects of space travel on human physiology will greatly benefit human crews to venture through the vast voids of space for months at a time. The continual operation of ISS leads to new knowledge about the design, development and operation of system and hardware that will be utilized in the development of new deep-space vehicles needed to fulfill the Vision for Exploration. This paper will provide an overview of the ISS Program, including a review of the events of the past year, as well as plans for next year and the future.

Author

International Space Station; Space Exploration; NASA Space Programs; Research Facilities

20070013618 National Physical Lab., New Delhi, India

Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing

Banerjee, P; Matsakis, D; Jan 2006; 15 pp.; In English; Original contains color illustrations

Report No.(s): AD-A463041; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/100.2/ADA463041>

The Global Positioning System (GPS) has become a key component of the world technology, and one measure of its success is that it has inspired enhancements and similar systems. GPS can therefore be considered the prototype of several existing or planned Global Navigation Satellite Systems (GNSS), with which term we also include supporting satellite-based enhancement systems. This paper briefly describes how GPS derives its timing, how GNSS systems are used for several means of precise time transfer, how carrier phase can assist time transfer, and how GNSS systems can cooperatively create improved products. Significant benefits in terms of robustness and precision can result from combining GNSS systems. Applications which may require them are situations involving interference, limited reception as in urban canyons or indoors, or where there is limited time to acquire a signal.

DTIC

Galileo Spacecraft; Global Positioning System; GLONASS; Time Dependence

20070013698 NASA Johnson Space Center, Houston, TX, USA

Space Suit Radiator Performance in Lunar and Mars Environments

Nabity, James; Mason, Georgia; Copeland, Robert; Libberton, Kerry; Stephan, Ryan; Trevino, Luis; Paul, Heather; January 2005; 13 pp.; In English; 37th International Conference on Environmental, 9-12 Jul. 2007, Chicago, IL, USA; Original contains color illustrations

Contract(s)/Grant(s): NAS9-03052; 731384.06.04.01.05.10

Report No.(s): 07ICES-221; Copyright; Avail.: CASI: [A03](#), Hardcopy

During an ExtraVehicular Activity (EVA), both the heat generated by the astronaut's metabolism and that produced by the Portable Life Support System (PLSS) must be rejected to space. The heat sources include the heat of adsorption of metabolic CO₂, the heat of condensation of water, the heat removed from the body by the liquid cooling garment and the load from the electrical components. Although the sublimator hardware to reject this load weighs only 1.58 kg (3.48 lbm), an additional 3.6 kg (8 lbm) of water are loaded into the unit, most of which is sublimated and lost to thus become the single largest expendable during an eight hour EVA. We can significantly reduce the amount of expendable water consumed in the sublimator by using a radiator to reject heat from the Astronaut during an EVA. Last year we reported on the design and initial operational assessment tests of our novel radiator designated the Radiator And Freeze Tolerant heat eXchanger (RAFT-X). Herein, we report on tests conducted in the NASA Johnson Space Center Chamber E Thermal Vacuum Test Facility. Up to 260 W (900 Btu/h) of heat were rejected in Lunar and Mars environments with temperatures as cold as -170 C (- 275 F).

Further, the RAFT-X endured several freeze / thaw cycles and in fact, the heat exchanger was completely frozen three times without any apparent damage to the unit.

Author

Lunar Environment; Mars Environment; Space Suits; Test Facilities; Thermal Vacuum Tests; Radiators

20070013700 Wyle Labs., Inc., USA

Cabin Air Quality On Board Mir and the International Space Station: A Comparison

Macatangay, Ariel; Perry, Jay L.; January 22, 2007; 20 pp.; In English; International Conference on Environmental Systems, 9-12 Jul. 2007, Chicago, IL, USA; Copyright; Avail.: CASI: [A03](#), Hardcopy

The maintenance of the cabin atmosphere aboard spacecraft is critical not only to its habitability but also to its function. Ideally, air quality can be maintained by striking a proper balance between the generation and removal of contaminants. Both very dynamic processes, the balance between generation and removal can be difficult to maintain and control because the state of the cabin atmosphere is in constant evolution responding to different perturbations. Typically, maintaining a clean cabin environment on board crewed spacecraft and space habitats is the central function of the environmental control and life support (ECLS) system. While active air quality control equipment is deployed on board every vehicle to remove carbon dioxide, water vapor, and trace chemical components from the cabin atmosphere, perturbations associated with logistics, vehicle construction and maintenance, and ECLS system configuration influence the resulting cabin atmospheric quality. The air-quality data obtained from the International Space Station (ISS) and NASA-Mir programs provides a wealth of information regarding the maintenance of the cabin atmosphere aboard long-lived space habitats. A comparison of the composition of the trace chemical contaminant load is presented. Correlations between ground-based and in-flight operations that influence cabin atmospheric quality are identified and discussed, and observations on cabin atmospheric quality during the NASA-Mir expeditions and the International Space Station are explored.

Author

Air Quality; Cabin Atmospheres; International Space Station; Mir Space Station; NASA Space Programs

20070013702 NASA Johnson Space Center, Houston, TX, USA

A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO

Liou, J. C.; Johnson, Nicholas L.; [2007]; 1 pp.; In English; 58th International Astronautical Congress, 24-28 Sept. 2007, Hyderabad, India; No Copyright; Avail.: Other Sources; Abstract Only

The near-Earth orbital debris population will continue to increase in the future due to ongoing space activities, on-orbit explosions, and accidental collisions among resident space objects. Commonly adopted mitigation measures, such as limiting postmission orbital lifetimes of satellites to less than 25 years, will slow down the population growth, but may be insufficient to stabilize the environment. The nature of the growth, in the low Earth orbit (LEO) region, is further demonstrated by a recent study where no future space launches were conducted in the environment projection simulations. The results indicate that, even with no new launches, the LEO debris population would remain relatively constant for only the next 50 years. Beyond that, the debris population would begin to increase noticeably, due to the production of collisional debris. Therefore, to better limit the growth of future debris population to protect the environment, remediation option, i.e., removing existing large and massive objects from orbit, needs to be considered. This paper does not intend to address the technical or economical issues for active debris removal. Rather, the objective is to provide a sensitivity study to quantify the effectiveness of various remediation options. A removal criterion based upon mass and collision probability is developed to rank objects at the beginning of each projection year. This study includes simulations with removal rates ranging from 2 to 20 objects per year, starting in the year 2020. The outcome of each simulation is analyzed, and compared with others. The summary of the study serves as a general guideline for future debris removal consideration.

Author

Low Earth Orbits; Sensitivity; Space Debris; Aerospace Environments

20070013710 NASA Marshall Space Flight Center, Huntsville, AL, USA

Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism

Spann, James F., Jr.; Abbas, Mian; [2006]; 1 pp.; In English; 2006 Fall American Geophysical Union Meeting, 11-15 Dec, 2006, San Francisco, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

Going back to the lunar surface offers an opportunity to understand the dust environment and associated transport mechanisms. This talk will explore what measurements are required to understand and characterize the dust-plasma environment in which robotic and human activities will be conducted. The understanding gained with the measurements can

be used to make informed decisions on engineering solutions and follow-on investigations. Particular focus will be placed on required measurements of the size, spatial and charge distribution of the suspended lunar regolith.

Author

Lunar Dust; Lunar Surface; Transport Properties; Robotics

20070013722 NASA Marshall Space Flight Center, Huntsville, AL, USA

Heliophysics Science Enabled By the Return to the Moon

Spann, James F.; Spence, Harlan; Christensen, Andrew; [2006]; 1 pp.; In English; 2006 Fall American Geophysical Union Meeting, 11-15 Dec. 2006, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

The lunar plasma and radiation environment and those physical processes that drive and control it, are intrinsically part of the science domain of the Heliophysics Division. Since the inception of the space program with Explorer 1 in 1958 and continuing to the present, scientists in the Heliophysics community have concentrated on characterizing and understanding the connected Sun-Earth system including the regions the Moon traverses and the interaction of plasmas and radiation with large and small bodies. This has been accomplished with in situ and remote sensing instrumentation and physics- and numerically-based models that provide understanding of the dominant mechanisms that define the environment in which the Moon is immersed. Therefore, the Heliospheric science community is uniquely and in many cases exclusively qualified to address interesting and compelling science problems that are enabled by the return to the Moon. This talk will provide an overview of representative, high-priority science investigations that are made possible by the return to the lunar surface. The content of this presentation is a result of an ongoing effort to inventory and articulate compelling science topics and how they are enabled by the return to the Moon.

Author

Heliosphere; Plasma Radiation; Remote Sensing; Lunar Surface; Lunar Radiation; Plasmas (Physics)

20070013723 NASA Marshall Space Flight Center, Huntsville, AL, USA

Cross Cutting Structural Design for Exploration Systems

Semmes, Edmund B.; [2007]; 15 pp.; In English; 45th AIAA Aerospace Sciences Meeting, 8-11 Jan. 2007, Reno, NV, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20070013723>

The challenge of our new National Space Policy and NASA's Vision for Space Exploration (VSE) is keyed to the development of more effective space access and transportation systems. Optimizing in-space systems through innovative cross cutting structural designs that reduce mass, combine functional requirements and improve performance can significantly advance spacecraft designs to meet the ever growing demands of our new National Space Policy. Dependence on limited structural designs is no longer an option. We must create robust materials, forms, function and evolvable systems. We must advance national policy objectives in the design, development, test and operation of multi-billion dollar new generation crew capsules by enabling them to evolve in meeting the requirements of long duration missions to the moon and mars. This paper discusses several current issues and major design drivers for consideration in structural design of advanced spacecraft systems. Approaches to addressing these multifunctional requirements is presented as well as a discussion on utilizing Functional Analysis System Technique (FAST) in developing cross cutting structural designs for future spacecraft. It will be shown how easy it is to deploy such techniques in any conceptual architecture definition or ongoing preliminary design. As experts in merging mission, safety and life support requirements of the frail human existence into robust vehicle and habitat design, we will conquer the final frontier, harness new resources and develop life giving technologies for mankind through more innovative designs. The rocket equation tells us that a reduction in mass optimizes our propulsive results. Primary and secondary structural elements provide for the containment of gases, fluids and solids; translate and sustain loads/impacts; conduct/radiate thermal energy; shield from the harmful effects of radiation; provide for grounding/bonding of electrical power systems; compartmentalize operational functions; and provide physical interface with multiple systems. How can we redefine, combine, substitute, rearrange and otherwise modify our structural systems to reduce mass? New technologies will be needed to fill knowledge gaps and propagate new design methods. Such an integrated process is paramount in maintaining U.S. leadership and in executing our national policy goals. The cross cutting process can take many forms, but all forms will have a positive affect on the demanding design environment through initial radical thinking. The author will illustrate such cross cutting results achievable through a formal process called FAST. The FAST example will be used to show how a multifunctional structural system concept for long duration spacecraft might be generated.

Derived from text

Space Exploration; Systems Engineering; Spacecraft Design; Technology Utilization; Aeronautical Engineering

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation*.

20070011457 NASA Glenn Research Center, Cleveland, OH, USA

Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero

Jenkins, Phillip; Scheiman, Chris; Goodbody, Chris; Baur, Carsten; Sharps, Paul; Imaizumi, Mitsuru; Yoo, Henry; Sahlstrom, Ted; Walters, Robert; Lorentzen, Justin; Nocerino, John; Khan, Osman; Cravens, Robert; Valles, Juan; Toporow, Chantal; Gomez, Trinidad.; Bazan, Loreto Pazos; Bailey, Sheila; [2006]; 3 pp.; In English; 4th World Conference on Photovoltaic Energy Conversion, 8-12 May 2006, Kona, HI, USA

Contract(s)/Grant(s): 22-103-06-10; Copyright; Avail.: Other Sources

This paper reports the results of an international measurement round robin of monolithic, triple-junction, GaInP/GaAs/Ge space solar cells. Eight laboratories representing national labs, solar cell vendors and space solar cell consumers, measured cells using in-house reference cells and compared those results to measurements made where each lab used the same set of reference cells. The results show that most of the discrepancy between laboratories is likely due to the quality of the standard cells rather than the measurement system or solar simulator used.

Author

Solar Cells; Gallium Arsenides; Gallium Phosphides; Measurement; Calibrating; Solar Simulators

20070011610 Ceskoslovenska Akademie Ved, Prague, Czechoslovakia

Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations

Hellinger, P.; Travnicek, P.; Kasper, J. C.; Lazarus, A. J.; Geophysical Research Letters; May 06, 2006; Volume 33, Issue 9; 2 pp.; In English

Contract(s)/Grant(s): NNG05GB44G; Copyright; Avail.: Other Sources

ONLINE: <http://dx.doi.org/10.1029/2006GL025925>

We present a comparison between WIND/SWE observations (Kasper et al., 2006) of beta parallel to p and T perpendicular to p/T parallel to p (where beta parallel to p is the proton parallel beta and T perpendicular to p and T parallel to p are the perpendicular and parallel proton temperatures, respectively; here parallel and perpendicular indicate directions with respect to the ambient magnetic field) and predictions of the Vlasov linear theory. In the slow solar wind, the observed proton temperature anisotropy seems to be constrained by oblique instabilities, by the mirror one and the oblique fire hose, contrary to the results of the linear theory which predicts a dominance of the proton cyclotron instability and the parallel fire hose. The fast solar wind core protons exhibit an anticorrelation between beta parallel to c and T perpendicular to c/T parallel to c (where beta parallel to c is the core proton parallel beta and T perpendicular to c and T parallel to c are the perpendicular and parallel core proton temperatures, respectively) similar to that observed in the HELIOS data (Marsch et al., 2004).

Author

Anisotropy; Solar Wind; Linearity; Protons; Atmospheric Temperature

20070011611 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Coupled Groups of g-Modes in a Sun with Mixed Core

Wolff, Charles L.; ODonovan, Adam; [2007]; 2 pp.; In English; Copyright; Avail.: CASI: A01, Hardcopy

Groups of linear g-modes can sum to create long-lived nonlinear oscillations in small 'hot volumes' very deep in the Sun that help drive the modes. In these volumes (dimensions ~ 10 Mm), the time average rate of He-3 burning doubles as temperature fluctuations exceed 10% and rises by an order of magnitude for fluctuations of 25%. To be consistent with locally large motions, we impose a mixed shell on an otherwise standard solar model before computing g-mode solutions. Mixing in the assumed shell $r = (0.10 \pm 0.03) R_{\text{sun}}$ is rapid ($\sim 10^6$ yr) with slower mixing somewhat beyond. If l is the principal spherical harmonic index, a set of g-modes for any single l less than or equal to 15 with five consecutive radial harmonics can be excited with nearly linear thermal amplitudes, $A_{\text{sub T}}$ less than or equal to 0.053, throughout the star and a fractional temperature fluctuation in its hot volume of $(\Delta T)/T$ less than or equal to 0.18. These thresholds for excitation will become smaller when sets for several values of l are computed simultaneously. There is some evidence for the rotation of g-mode sets in the long solar activity record and g-mode upward wave flux has been suggested to explain the 1.3 yr reversing flows tentatively detected below the Sun's convective envelope (CE). The large local amplitudes needed for excitation implies that g-modes may transport a non-negligible fraction of the solar luminosity, yet their near linear amplitudes

outside the hot volume suggests amplitudes over most of the solar surface that would be barely detectable for $l \leq 3$. A formalism is presented for summing the g-modes and estimating growth rates under the approximation that modes are strictly linear except in a hot volume which holds only a few percent of mode kinetic energy. Finally over the range $2 \leq l \leq 30$, we summed all zonal harmonics, m , for a given l and computed the relative angular orientations that would release the most nuclear energy. This should be close to the physically preferred angular state of such a family and a few examples were displayed.

Author

Solar Activity; Helium Isotopes; Coupled Modes; Kinetic Energy

20070012346 NASA Johnson Space Center, Houston, TX, USA

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H⁺ Diffusion at L1

Calaway, Michael J.; Stansbery, Eileen K.; [2007]; 27 pp.; In English; Genesis Science Team Meeting, 11 Mar. 2007, Houston, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070012346>

A viewgraph presentation describing a solar wind substrate alteration on Genesis' melted and fused materials and hydrogen ion diffusion at L1 is shown.

CASI

Diffusion; Hydrogen Ions; Solar Wind; Substrates; Arrays; Composite Materials; Revisions; Genesis Mission

20070013721 NASA Marshall Space Flight Center, Huntsville, AL, USA

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra

Adams, David A.; Howell, Leonard W., Jr.; Adam, James H., Jr.; [2007]; 22 pp.; In English; Copyright; Avail.: CASI:

[A03](#), Hardcopy

This paper examines the error resulting from using a lineal energy spectrum to represent a linear energy transfer spectrum for applications in the space radiation environment. Lineal energy and linear energy transfer spectra are compared in three diverse but typical space radiation environments. Different detector geometries are also studied to determine how they affect the error. LET spectra are typically used to compute dose equivalent for radiation hazard estimation and single event effect rates to estimate radiation effects on electronics. The errors in the estimations of dose equivalent and single event rates that result from substituting lineal energy spectra for linear energy spectra are examined. It is found that this substitution has little effect on dose equivalent estimates in interplanetary quiet-time environment regardless of detector shape. The substitution has more of an effect when the environment is dominated by solar energetic particles or trapped radiation, but even then the errors are minor especially if a spherical detector is used. For single event estimation, the effect of the substitution can be large if the threshold for the single event effect is near where the linear energy spectrum drops suddenly. It is judged that single event rate estimates made from lineal energy spectra are unreliable and the use of lineal energy spectra for single event rate estimation should be avoided.

Author

Energy Transfer; Linear Energy Transfer (LET); Solar Physics; Radiation Effects; Aerospace Environments; Dosage; Estimates; Extraterrestrial Radiation

93

SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see *51 Life Sciences*; on human beings see *52 Aerospace Medicine*. For theory see *73 Nuclear Physics*.

20070011615 NASA Johnson Space Center, Houston, TX, USA

Space Environment (Natural and Induced)

Kim, Myung-Hee Y.; George, Kerry A.; Cucinotta, Francis A.; [2007]; 37 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Considerable effort and improvement have been made in the study of ionizing radiation exposure occurring in various regions of space. Satellites and spacecrafts equipped with innovative instruments are continually refining particle data and providing more accurate information on the ionizing radiation environment. The major problem in accurate spectral definition of ionizing radiation appears to be the detailed energy spectra, especially at high energies, which is important parameter for accurate radiation risk assessment. Magnitude of risks posed by exposure to radiation in future space missions is subject to

the accuracies of predictive forecast of event size of SPE, GCR environment, geomagnetic fields, and atmospheric radiation environment. Although heavy ion fragmentations and interactions are adequately resolved through laboratory study and model development, improvements in fragmentation cross sections for the light nuclei produced from HZE nuclei and their laboratory validation are still required to achieve the principal goal of planetary GCR simulation at a critical exposure site. More accurate prediction procedure for ionizing radiation environment can be made with a better understanding of the solar and space physics, fulfillment of required measurements for nuclear/atomic processes, and their validation and verification with spaceflights and heavy ion accelerators experiments. It is certainly true that the continued advancements in solar and space physics combining with physical measurements will strengthen the confidence of future manned exploration of solar system. Advancements in radiobiology will surely give the meaningful radiation hazard assessments for short and long term effects, by which appropriate and effective mitigation measures can be placed to ensure that humans safely live and work in the space, anywhere, anytime.

Derived from text

Aerospace Environments; Ionizing Radiation; Long Term Effects; Radiation Dosage; Radiation Hazards; Radiobiology; Radiation Damage; Solar Radiation

20070011687 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Electron-Induced Displacement Damage Effects in CCDs

Becker, Heidi N.; Elliott, Tom; Alexander, James W.; July 17, 2006; 5 pp.; In English; IEEE Nuclear and Space Radiation Effects Conference (NSREC), 17-21 Jul. 2006, Ponte Verde Beach, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/39815>

We compare differences in parametric degradation for CCDs irradiated to the same displacement damage dose with 10-MeV and 50-MeV electrons. Charge transfer efficiency degradation was observed to not scale with NIEL for small signals.

Author

Charge Coupled Devices; Damage; Displacement; Charge Transfer; Degradation

20070013726 National Space Science and Technology Center, Huntsville, AL, USA

Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection

Lin, Zi-Wei; [2007]; 8 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NNM05AA22A; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20070013726>

We present a semi-analytical method to determine which partial cross sections of nuclear fragmentations most affect the shielded dose equivalent due to exposure to galactic cosmic rays. The cross sections thus determined will require more theoretical and/or experimental studies in order for us to better predict, reduce and mitigate the radiation exposure in human space explorations.

Author

Fragmentation; Radiation Protection; Radiation Dosage; Extraterrestrial Radiation; Exposure

Subject Term Index

ABDOMEN

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

ABERRATION

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285

ABSORBENTS

Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45

ABSTRACTS

International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006 – 42

ABUNDANCE

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150

ACCELERATION (PHYSICS)

A Magnetohydrodynamic Boost for Relativistic Jets – 117

Acceleration Physics Code Web Repository – 237

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

ACCELERATORS

Accelerator Physics Code Web Repository – 268

Advantages of the Program-Based Logbook Submission GUI at Jefferson Lab – 271

Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291

Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61

Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271

ACCOUNTING

Standardizing an End-to-end Accounting Service – 72

ACCRETION DISKS

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

ACCUMULATORS

Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

ACIDS

Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51

ACOUSTIC EMISSION

Castable and High Modulus Acoustic Dampening Material – 306

ACOUSTIC PROPERTIES

Acoustic Design of Naval Structures – 279

Castable and High Modulus Acoustic Dampening Material – 306

IAM Slutrapport 2005 (IAM Annual Report 2005) – 278

Method for Real Time Matched Field Processing – 254

ACOUSTICS

Acoustic Design of Naval Structures – 279

Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129

Progress Toward Improving Jet Noise Predictions in Hot Jets – 278

ACQUISITION

Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259

ACTINIDE SERIES

QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 269

ACTIVATED CARBON

Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 42

ACTIVATION ANALYSIS

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138

ACTUATORS

Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3

Double Hidden Flexure Microactuator for Phase Mirror Array – 98

Electromechanical Actuators – 108

Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114

ADAPTATION

Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers – 95

Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm – 208

Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85

The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems – 221

The Implications of Complex Adaptive Systems Theory for C2 – 81

ADAPTIVE CONTROL

Intelligent Control Management of Autonomous Air Vehicles – 16

Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 3

ADAPTIVE OPTICS

Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120

ADDITIVES

Evaluations of QMI After-Market Additives – 7

ADENOVIRUSES

Targeting Stromal Recruitment by Prostate Cancer Cells – 173

ADHESION

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

ADHESIVE BONDING

Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments – 15

ADJUSTING

A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302

ADSORBENTS

Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 42

ADSORPTION

Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 42

AERIAL PHOTOGRAPHY

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22

AERIAL RECONNAISSANCE

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

AEROBES

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

AERODYNAMIC FORCES

The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2

AERODYNAMICS

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134

Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2

AEROGELS

Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

AERONAUTICAL ENGINEERING

Cross Cutting Structural Design for Exploration Systems – 325

AERONAUTICS

National Aeronautics Research and Development Policy – 4

AEROSOLS

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site – 131

AEROSPACE ENGINEERING

Solar Sail Model Validation from Echo Trajectories – 37

Sustained Space Superiority: A National Strategy for the USA – 27

AEROSPACE ENVIRONMENTS

A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324

Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors – 318

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327

Operational Art for Space Control: Do the Principles of War Apply – 28

Space Environment (Natural and Induced) – 327

The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33

AEROSPACE INDUSTRY

Nanomaterials Work at NASA-Johnson Space Center – 289

AEROSPACE MEDICINE

Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206

Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198

Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207

Index of International Publications in Aerospace Medicine – 205

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204

Nutritional Status Assessment (SMO 016E) – 203

Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – 204

Space Exploration: Challenges in Medicine, Research, and Ethics – 205

Unmanned Aircraft Pilot Medical Certification Requirements – 205

AEROSPACE SAFETY

International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310

Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool – 11

AEROSPACE SYSTEMS

AOC Embedded Performance Measurement and Assessment – 228

Director of Space Forces: Refocused for the Way Ahead – 26

Military Role in Space Control: A Primer – 24

Toward a Framework for Modeling Space Systems Architectures – 236

Towards a Framework for Modeling Space Systems Architectures – 220

AEROSPACE VEHICLES

Multidisciplinary Computational Research – 252

'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – 34

AFGHANISTAN

Airpower, Afghanistan, and the Future of Warfare: An Alternative View – 6

Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan – 152

AFRICA

Africa Command: An Interagency Solution and SOF's Role – 139

Development of the Meharry Medical College Prostate Cancer Research Program – 191

AGE FACTOR

Age 60 Aviation Rulemaking Committee: Report to the Federal Aviation Administration, November 29, 2006 – 5

AGING (BIOLOGY)

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193

AGING (MATERIALS)

Aging Properties of An HTPB Propellant – 261

AGRICULTURE

Respiratory Disease in Agricultural Workers: Mortality and Morbidity Statistics – 147

AIR CARGO

An Advanced Tabu Search Approach to the Airlift Loading Problem – 251

AIR DEFENSE

Air Force Space Doctrine: Is It Ready for Weapons in Space? – 29

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7

AIR LAND INTERACTIONS

Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158

AIR MASSES

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

AIR NAVIGATION

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12

Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22

AIR POLLUTION

Changing Face of Ozone Management. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Estimating Emissions Associated with Portable Fuel Containers (PFCs) – 140

Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 144

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – 144

Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee – 143

Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – 144

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4 – 142

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

Modeling Air Quality Recent Advances and Challenges. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Quality Assurance Handbook for Air Pollution Measurement Systems. Volume 2. Ambient Air Specific Methods (Interim Edition) – 140

AIR QUALITY

Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324

Changing Face of Ozone Management. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – 144

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

Modeling Air Quality Recent Advances and Challenges. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Role of Renewable Energy in Reducing Greenhouse Gas Buildup. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148

AIR TRAFFIC CONTROL

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 22

Effective USAF Air Traffic Control to Support Proposed Phase IV Operations – 13

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 77

Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13

AIR TRANSPORTATION

A Robust Scalable Transportation System Concept – 237

Airport Security System – 10

AIR WATER INTERACTIONS

Ocean Mixed Layer Response to Gap Wind Scenarios – 156

AIRBORNE EQUIPMENT

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134

AIRCRAFT CONFIGURATIONS

Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafol Recovery System – 14

AIRCRAFT ENGINES

Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3

Innovative Methods for Engine Health Monitoring – 20

AIRCRAFT GUIDANCE

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 22

AIRCRAFT INDUSTRY

An Advanced Tabu Search Approach to the Airlift Loading Problem – 251

AIRCRAFT MODELS

Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region – 1

AIRCRAFT SAFETY

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 134

AIRCRAFT

Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration – 16

Review of Methods and Approaches for the Structural Risk Assessment of Aircraft – 15

AIRFOILS

Thermal Shield Turbine Airfoil – 2

Triple Circuit Turbine Blade – 35

AIRFRAMES

Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18

AIRPORT SECURITY

Airport Security System – 10

AIRPORTS

Airport Improvement Program: Issues for Congress – 23

Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 22

Aviation Security: TSA's Staffing Allocation Model Is Useful for Allocating Staff among Airports, but Its Assumptions Should Be Systematically Reassessed – 4

Federal Aviation Administration, Office of Airports (ARP) Business Plan, 2007 – 4

AIRSHIPS

Lowering the High Ground: Using Near-Space Vehicles for Persistent C3ISR – 9

ALERTNESS

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendmiddelen in marmosetapen) – 201

Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

Sleep and Alertness Management – 200

ALGORITHMS

2006 Interferometry Imaging Beauty Contest – 119

A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252

A Parallel Saturation Algorithm on Shared Memory Architectures – 236

An Advanced Tabu Search Approach to the Airlift Loading Problem – 251

Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – 99

Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255

Cooperative Autonomous Mobile Robots – 228

- Flocking for Multi-Agent Dynamic Systems: Algorithms and Theory – 249
- From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 253
- Fusing Competing Prediction Algorithms for Prognostics (Preprint) – 250
- IAM Slutrapport 2005 (IAM Annual Report 2005) – 278
- Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186
- Improving Interpolation in BoomerAMG – 213
- Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
- Particle Filtering With Dynamic Shape Priors – 251
- Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248
- ALIGNMENT**
- Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12
- ALKANES**
- Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
- ALKENES**
- A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- ALKYL COMPOUNDS**
- Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59
- ALLOYS**
- Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 54
- ALTERNATING CURRENT**
- A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- ALTIMETERS**
- Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- ALUMINUM ALLOYS**
- A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact – 265
- Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al2O3 and Al3-X Compounds (X= Ti, V, Zr) – 66
- Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- ALUMINUM COMPOUNDS**
- Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- ALUMINUM OXIDES**
- Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al2O3 and Al3-X Compounds (X= Ti, V, Zr) – 66
- ALUMINUM**
- SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- AMBIGUITY**
- A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302
- Classification of Targets Using Optimized ISAR Euler Imagery – 74
- Exploitation of ISAR Imagery in Euler Parameter Space – 74
- AMINO ACIDS**
- Selenoproteins and Prostate Cancer – 170
- AMMUNITION**
- Network-Enabled Precision Guided Munitions – 244
- AMPLIFICATION**
- Amplification of Type II Cadherins in Prostate Cancer – 161
- ANALOGS**
- Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 68
- Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- ANALYSIS (MATHEMATICS)**
- Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252
- ANEMIAS**
- MPD in Telomerase Null Mice – 165
- ANGIOGENESIS**
- Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188
- ANGLES (GEOMETRY)**
- Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 137
- ANIMALS**
- High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 180
- JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173
- ANISOTROPY**
- MOSSFRAC: An Anisotropic 3D Fracture Model – 43
- Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326
- Tunneling Anisotropic Magnetoresistive Device and Method of Operation – 94
- ANTARCTIC REGIONS**
- Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 150
- Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- ANTENNA ARRAYS**
- Gruppennteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Variable Resolution Direction Finding Using the Robust Symmetrical Number System – 104
- ANTENNA COMPONENTS**
- Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- ANTENNA DESIGN**
- Investigations into Novel Multi-Band Antenna Designs – 110
- ANTENNA RADIATION PATTERNS**
- Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- ANTENNAS**
- Investigations into Novel Multi-Band Antenna Designs – 110
- Variable Resolution Direction Finding Using the Robust Symmetrical Number System – 104
- ANTI-AIRCRAFT MISSILES**
- Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 14

ANTIBIOTICS

Examination of Potential Anti-Tumor Activity of N-Thiolated β -Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – [194](#)

ANTIBODIES

Amplification of Type II Cadherins in Prostate Cancer – [161](#)

Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – [167](#)

ANTIGENS

Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – [186](#)

Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – [167](#)

Enhancing the Immune Response to Recombinant Plague Antigens – [195](#)

Role of the ARF Tumor Suppressor in Prostate Cancer – [172](#)

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – [175](#)

ANTIMISSILE DEFENSE

Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – [80](#)

ANTITANK MISSILES

Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – [14](#)

APERTURES

A Simulation Study of Multi-Channel RADARSAT-2 GMTI – [121](#)

Low-cost Large Aperture Telescopes for Optical Communications – [284](#)

APOLLO 17 FLIGHT

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – [321](#)

APOPTOSIS

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – [68](#)

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – [193](#)

The Role of Caspase-8 in Breast Carcinoma Cells – [189](#)

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – [188](#)

APPALACHIAN MOUNTAINS (NORTH AMERICA)

Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – [154](#)

APPLICATIONS PROGRAMS (COMPUTERS)

The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems – [222](#)

AQUIFERS

Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – [51](#)

Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices – [222](#)

Hydrostratigraphic Framework of the Raton, Vermejo, and Trinidad Aquifers in the Raton Basin, Las Animas County, Colorado – [211](#)

ARC DISCHARGES

NASA GRC and MSFC Space-Plasma Arc Testing Procedures – [289](#)

ARCHITECTURE (COMPUTERS)

A Coordinated Initialization Process for the Distributed Space Exploration Simulation – [233](#)

A Parallel Saturation Algorithm on Shared Memory Architectures – [236](#)

Agile Assessment Techniques for Evaluating Mission Capability Portfolio Ensembles in Complex Adaptive Architectures – [234](#)

National Command Capability (NCC): Design for a Collaboration Architecture – [243](#)

Separate Write and Read Access Architecture for a Magnetic Tunnel Junction – [94](#)

Sustainable, Reliable Mission-Systems Architecture – [242](#)

Toward a Framework for Modeling Space Systems Architectures – [236](#)

Towards a Framework for Modeling Space Systems Architectures – [220](#)

Workshop: Theory an Applications of Coupled Cell Networks – [256](#)

ARCTIC OCEAN

Global Warming and the Combatant Commander: Engaging the Arctic Region – [135](#)

ARCTIC REGIONS

Global Warming and the Combatant Commander: Engaging the Arctic Region – [135](#)

Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – [312](#)

ARES 1 LAUNCH VEHICLE

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – [33](#)

ARGON

Physics Analysis of a Gas Attenuator with Argon as a Working Gas – [269](#)

ARMED FORCES (UNITED STATES)

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – [18](#)

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – [157](#)

U.S. Army Environmental Center. Fort Dix Community Relations Plan – [308](#)

ARRAYS

Carbon Nanotube Nanoelectrode Arrays – [110](#)

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H⁺ Diffusion at L1 – [327](#)

ARRIVALS

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – [22](#)

ARSENIC

Interactive Workshop on Arsenic Removal from Drinking Water (on CD-ROM) – [52](#)

ARTERIES

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – [188](#)

ARTIFICIAL GRAVITY

Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – [206](#)

Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – [198](#)

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – [199](#)

Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – [207](#)

International Multidisciplinary Artificial Gravity (IMAG) Project – [199](#)

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – [204](#)

The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – [198](#)

ARTIFICIAL INTELLIGENCE

Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice – [248](#)

PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – [246](#)

ARTIFICIAL SATELLITES

Military Role in Space Control: A Primer – 24

Space-Based Observations of Satellites From the MOST Microsatellite – 25

ASCENT TRAJECTORIES

Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29

ASHES

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

ASPECT RATIO

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115

ASPHALT

Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39

ASSAYING

Development of a Computational Assay for the Estrogen Receptor – 179

Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162

ASSESSMENTS

Assessing the Dangers of Moon Dust – 206

Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 145

Review of Methods and Approaches for the Structural Risk Assessment of Aircraft – 15

ASTEROID MISSIONS

Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36

ASTEROIDS

Radar Images of Asteroid 100085 (1992 UY4) – 313

ASTHMA

Asthma and Physical Activity in the School: Making a Difference – 148

ASTROMETRY

Very Large Array Plus Pie Town Astrometry of 46 Radio Stars – 316

ASTRONAUT TRAINING

Results from an Investigation into Extra-Vehicular Activity (EVA) Training related Shoulder Injuries – 204

ASTRONAUTS

Chromosome Aberrations in Astronauts – 203

ASTRONOMY

Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118

LISA-The Library and Information Services in Astronomy Conferences – 315

ASTROPHYSICS

International Heliophysical Year SCINDA Workshop/Abstract – 319

Smoothed Particle Hydrodynamics: Applications Within DSTO – 116

ASYMMETRY

The Knowledge Structure of the Commander in Asymmetric Battlefield: The Six Sights and Sensemaking Process – 92

ASYMPTOTIC METHODS

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

ATLANTIC OCEAN

Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 147

ATMOSPHERIC CIRCULATION

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

ATMOSPHERIC COMPOSITION

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

ATMOSPHERIC MODELS

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65

Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154

Modeling Air Quality Recent Advances and Challenges. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233

Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148

ATMOSPHERIC PRESSURE

Emissions Control in Swirl-Stabilized Combustors – 125

ATMOSPHERIC TEMPERATURE

Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326

ATMOSPHERIC TURBULENCE

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

ATOMIC PHYSICS

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

ATTACK AIRCRAFT

Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 14

ATTENUATORS

Physics Analysis of a Gas Attenuator with Argon as a Working Gas – 269

ATTITUDE (INCLINATION)

Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207

Virtual Pan/Tilt Camera System and Method for Vehicles – 98

AUDIO TAPES

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321

AUDITORY PERCEPTION

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

AUDITORY SIGNALS

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

AUGMENTATION

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quaterly Technical Progress Report July 1-September 30, 2006 – 60

Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 176

Facilitating Informed Decisionmaking: The E-DEL+I(trademark) Analytic Technique – 248

Phonon Enhancement of Electronic and Optoelectronic Devices – 105

QACTIS Enhancements in TREC QA-2006 – 305

AUSTRALIA

A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238

AUTOMATIC CONTROL

Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images – 212

- Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 218
- Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes – 208
- AUTOMOBILES**
On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147
- AUTONOMOUS NAVIGATION**
Cooperative Autonomous Mobile Robots – 228
Design and Analysis of Side-Looking Sonar Experiments – 279
Intelligent Control Management of Autonomous Air Vehicles – 15
Virtual Pan/Tilt Camera System and Method for Vehicles – 98
- AUTONOMY**
A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302
Cooperative Autonomous Mobile Robots – 228
Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – 244
In-Space Crew-Collaborative Task Scheduling – 248
Intelligent Control Management of Autonomous Air Vehicles – 15
NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134
Network on Target: Remotely Configured Adaptive Tactical Networks – 240
Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 14
- AVALANCHES**
C2 Policy Panel: Under the Avalanche, Which Way Is Up? – 85
- AVIONICS**
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34
Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20
- BACKSCATTERING**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74
- BALLISTIC MISSILES**
Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 80
- BANDWIDTH**
Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- BARIIUM TITANATES**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- BARYONS**
Light Baryon Spectrum using Improved Interpolating Operators – 270
Study of Charm Baryons with the BaBar Experiment – 268
- BASALT**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 152
- BATHYMETERS**
Extraction and Rendering Techniques for Digital Charting Databases – 136
- BEAM SPLITTERS**
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- BEAM STEERING**
Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – 59
- BEAMFORMING**
Beam Transport Lines for the BSNS – 291
- BEAMS (RADIATION)**
Beam Transport Lines for the BSNS – 291
- BED REST**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- BIAS**
Bias-Adjusted Magnetoresistive Devices for Magnetic Random Access Memory (MRAM) Applications – 94
- BIBLIOGRAPHIES**
Index of International Publications in Aerospace Medicine – 205
- BIOASSAY**
Nutritional Status Assessment (SMO 016E) – 203
- BIOASTRONAUTICS**
2nd ISS Treadmill Development ‘T2 Project’ – 207
- BIOCHEMISTRY**
Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software – 165
Identification and Validation of PTEN Complex, Associated Proteins – 182
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- BIODEGRADATION**
Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: ‘In situ’ Bioremediation of the Upper Aquifer – 51
- BIOELECTRICITY**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
- BIOLOGICAL EFFECTS**
Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273
Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- BIOMARKERS**
Detecting Life and Biology-Related Parameters on Mars – 196
Nutritional Status Assessment (SMO 016E) – 203
- BIOMETRICS**
Biometric Collection, Transmission and Storage Standards. Version 1.1 – 232
Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes – 208
The National Biometrics Challenge – 210
- BIOMIMETICS**
Pandora’s Box Opened Wide: UAVs Carrying Genetic Weapons – 17
Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- BIONICS**
Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109
- BIOPHYSICS**
Chromosome Aberrations in Astronauts – 203
- BIOSYNTHESIS**
Role of the ARF Tumor Suppressor in Prostate Cancer – 173

BIOTECHNOLOGY

Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246

BIPOLAR TRANSISTORS

Phonon Enhancement of Electronic and Optoelectronic Devices – 106

BIRKELAND CURRENTS

Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264

BISMUTH

Bismuth Propellant Feed System Development at NASA-MSFC – 71

BLACK BODY RADIATION

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127

BLACK HOLES (ASTRONOMY)

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

BLOOD CELLS

MPD in Telomerase Null Mice – 165

BLOOD VESSELS

An In Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

BLOOD

Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162

Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165

BODY CENTERED CUBIC LATTICES

c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61

BOLOMETERS

Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279

BOLTS

Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hang-ups – 130

BONDING

Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67

BONE DEMINERALIZATION

Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206

BONE MARROW

Function of Periecan Domain 1 in Prostate Cancer – 163

MPD in Telomerase Null Mice – 165

BONES

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187

Overuse Injury Assessment Model – 202

BOOSTER ROCKET ENGINES

Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hang-ups – 130

BORON

Boron-Doped Nanocrystalline Diamond – 97

BOROSILICATE GLASS

Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60

BOUNDARIES

Comparing Evaluation Metrics for Sentence Boundary Detection – 75

BOUNDARY ELEMENT METHOD

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

BRAGG REFLECTORS

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 103

BRAIN

Tissue Tracking: Applications for Brain MRI Classification – 281

BREAST

A Comprehensive Postdoctoral Training Program in Breast Cancer – 190

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187

An In Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 193

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 67

Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177

Bioavailability of TGF-Beta in Breast Cancer – 192

Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – 186

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185

Development of a Computational Assay for the Estrogen Receptor – 179

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178

Endocrine Therapy of Breast Cancer – 183

ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182

Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194

Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161

Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation – 178

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis In Vitro Screen – 188

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181

Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – 179

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193

The Role of Capase-8 in Breast Carcinoma Cells – 189

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

Undergraduate Summer Training Program in Breast Cancer Imaging – 171

- Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175
- Vectors for Treatment of Metastatic Breast Cancer – 184
- BRIDGES (STRUCTURES)**
- Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 70
- Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47
- BROADBAND**
- Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers – 95
- Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123
- Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
- Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- BROMIDES**
- Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- BUDGETING**
- Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294
- BUILDINGS**
- Durable Wood Composites for Naval Low-Rise Buildings – 49
- Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- BURST TESTS**
- Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 49
- BUTT JOINTS**
- Development of the Butt Joint for the ITER Central Solenoid – 274
- C BAND**
- Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- C++ (PROGRAMMING LANGUAGE)**
- AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 224
- CABIN ATMOSPHERES**
- Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324
- CALCIFEROL**
- Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D – 191
- Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193
- Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185
- CALIBRATING**
- Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12
- Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- CAMERAS**
- Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123
- Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 150
- Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279
- Virtual Pan/Tilt Camera System and Method for Vehicles – 98
- CANCER**
- A Comprehensive Postdoctoral Training Program in Breast Cancer – 190
- A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190
- A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187
- Amplification of Type II Cadherins in Prostate Cancer – 161
- An in Vitro Study of Breast Cancer Invasion into the Lymphatics – 177
- Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 193
- Anticancer Inhibitors of AR-Mediated Gene Expression – 172
- Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 67
- AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180
- Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177
- Bioavailability of TGF-Beta in Breast Cancer – 192
- Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – 186
- Cellular Targets of Dietary Polyphenol Resveratrol – 54
- Constitutive Activation of NF-kappaB in Prostate Carcinoma Cells Through a Positive Feedback Loop: Implication of Inducible IKK-Related Kinase (IKKi) – 164
- Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163
- Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193
- Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180
- Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183
- Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185
- Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – 167
- Development of a Computational Assay for the Estrogen Receptor – 179
- Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178
- Development of STEAP-based Vaccines for the Treatment of Prostate Cancer – 192
- Development of the Meharry Medical College Prostate Cancer Research Program – 191
- Endocrine Therapy of Breast Cancer – 183
- Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 176
- ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182
- Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194
- FGF Signaling and Dietary Factors in the Prostate – 175
- Function of Periecan Domain 1 in Prostate Cancer – 163
- Genes Involved in Oxidation and Prostate Cancer Progression – 186
- Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168

Identification and Validation of PTEN Complex, Associated Proteins – 182

Identification of Breast Cancer Specific Proteolytic Activities for Targeted Pro-drug Activation – 178

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

Immune Cells, if Rendered Insensitive to Transforming Growth Factorbeta, Can Cure Prostate Cancer – 195

Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166

Integrated Cancer Research in Five Thematic Areas of Interest – 176

Intra-Operative Dosimetry in Prostate Brachytherapy – 168

Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165

Microlocalization and Quantitation of Risk Associated Elements in Gleason Graded Prostate Tissue – 175

Molecular Characterization of Squamous Cell Carcinomas From Recessive Dys-trophic Epidermolysis Bullosa – 194

Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D – 191

Preclinical Mouse Models of Neurofibromatosis – 191

Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF_Beta-Insensitive CD8+ T Cells for Treatment of Prostate Cancer – 190

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181

Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167

Proteomic Analysis of Cisplatin-Resistant Ovarian Cancers – 173

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 187

Role of PAK6 in Prostate Cancer – 182

Role of TGF-beta in Prostate Cancer Progression – 171

Role of the ARF Tumor Suppressor in Prostate Cancer – 172

Selenoproteins and Prostate Cancer – 170

Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165

Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy – 170

Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – 179

Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193

Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents – 187

Targeting Stromal Recruitment by Prostate Cancer Cells – 173

Telomere Length as a Predictor of Aggressive Prostate Cancer – 184

The Role of Capase-8 in Breast Carcinoma Cells – 189

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162

Undergraduate Summer Training Program in Breast Cancer Imaging – 171

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

Vaccine Immunotherapy for Prostate Cancer – 161

Vectors for Treatment of Metastatic Breast Cancer – 184

Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

CANS

Estimating Emissions Associated with Portable Fuel Containers (PFCs) – 140

CARBIDES

Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62

CARBON ARCS

Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73

CARBON CYCLE

The NASA Orbiting Carbon Observatory – 311

CARBON DIOXIDE

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145

Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 146

The NASA Orbiting Carbon Observatory – 310

The Orbiting Carbon Observatory: Mission Overview – 311

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

CARBON FIBERS

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41

CARBON MONOXIDE

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

CARBON NANOTUBES

Carbon Nanotube Nanoelectrode Arrays – 110

Carbon Nanotube Resonator Transistor and Method of Making Same – 109

Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140

Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – 265

Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73

Nanomaterials Work at NASA-Johnson Space Center – 289

Sidewall-Functionalized Carbon Nanotubes and Methods for making the Same – 66

CARBON STEELS

Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 64

CARBONACEOUS CHONDRITES

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150

- The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- CARBONACEOUS METEORITES**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- CARBONATES**
Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 146
- CARBON-CARBON COMPOSITES**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
- CARBONIC ACID**
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 147
- CARBON**
Analysis of Particulate Nitrate and Black Carbon Time Series – 142
c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61
Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- CARBOXYLIC ACIDS**
Purification of Carboxylic Acids by Complexation with Selective Solvents – 44
- CARCINOGENS**
A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190
JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173
- CARDIOLOGY**
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- CARDIOVASCULAR SYSTEM**
Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor – 46
Nutritional Status Assessment (SMO 016E) – 203
- CARGO**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
External Cargo Integration Overview – 30
- CASSINI MISSION**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
The Cassini-Huygens Mission Overview – 311
The Cassini-Huygens Sequence Development Process – 310
- CASTINGS**
Castable and High Modulus Acoustic Dampening Material – 306
- CASTING**
Castable and High Modulus Acoustic Dampening Material – 306
- CASUALTIES**
Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 196
U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations – 254
- CATALYSTS**
Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – 144
Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – 265
War without Oil: A Catalyst for True Transformation – 136
- CATHODES**
81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138
- CAVITIES**
Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultraportable Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123
Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 126
Low-Drag Hydrodynamic Surfaces – 115
- CAVITY FLOW**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Post-print) – 114
- CCD CAMERAS**
Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 151
- CD-ROM**
Interactive Pit Lakes 2004 Conference (on CD-ROM) – 294
Interactive Workshop on Arsenic Removal from Drinking Water (on CD-ROM) – 52
Liquid Crystal Polymers as a Machine Fluid (on CD-ROM) – 40
Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – 294
- CELL DIVISION**
Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor – 46
- CELLS (BIOLOGY)**
High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 180
Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193
- CENSORED DATA (MATHEMATICS)**
Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 187
- CERAMIC FIBERS**
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – 58
- CERAMICS**
Geopolymers for Structural Ceramic Applications – 68
High Temperature Characterization of Ceramic Pressure Sensors – 120
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – 57
- CEREBROSPINAL FLUID**
Tissue Tracking: Applications for Brain MRI Classification – 281
- CERTIFICATION**
Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154
Lightning Protection System for HE Facilities at LLNL-Certification Template – 154
National Environmental Laboratory Accreditation Conference. Constitution, By-laws, and Standards Approved July 1998 – 38

Unmanned Aircraft Pilot Medical Certification Requirements – 205

CHANNELS (DATA TRANSMISSION)
Slutrapport foer Projekt KOMET (Final Report of the Projekt KOMET) – 89

CHARACTERIZATION
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 126
Microcantilever Sensors for In-Situ Sub-surface Characterization. 2006 ERSD Annual Report – 53

CHARGE COUPLED DEVICES
Electron-Induced Displacement Damage Effects in CCDs – 328

CHARGE TRANSFER
Electron-Induced Displacement Damage Effects in CCDs – 328

CHARGED PARTICLES
Analytical Ion Thruster Discharge Performance Model – 36

CHARM (PARTICLE PHYSICS)
Exotic and Higher Spin Mesons in Charmonium – 271
Study of Charm Baryons with the BaBar Experiment – 268

CHARTS
Advanced Visualization for Operational Assessment (Briefing Charts) – 258
Extraction and Rendering Techniques for Digital Charting Databases – 136
Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79
The Command and Control Joint Integrating Concept (C2 JIC) ‘Spreading the Word’ (Briefing Charts) – 240

CHEMICAL ANALYSIS
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
Quality Assurance Handbook for Air Pollution Measurement Systems. Volume 2. Ambient Air Specific Methods (Interim Edition) – 140

CHEMICAL COMPOSITION
Optical Characterization of Micro Particles in Molecular Plasmas – 56

CHEMICAL DETECTION
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
Carbon Nanotube Nanoelectrode Arrays – 110

CHEMICAL ENGINEERING
Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report – 267

CHEMICAL LASERS
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 124

CHEMICAL OXYGEN-IODINE LASERS
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 124

CHEMICAL REACTIONS
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150
Chemoselective Ligation – 52

CHEMICAL WARFARE
Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 79

CHEMOTHERAPY
Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents – 187
Targeting Mechanisms of Resistance to Taxane-Based Chemotherapy – 159
XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

CHINA
Air War Beyond the First Island Chain: Implications of China’s Military Modernization for U.S. Maritime Strategy – 17

CHIRALITY
Detecting Life and Biology-Related Parameters on Mars – 196
Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270

CHLORIDES
Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52

CHROMOSOME ABERRATIONS
Chromosome Aberrations in Astronauts – 203

CHROMOSOMES
Amplification of Type II Cadherins in Prostate Cancer – 161

CHRONIC CONDITIONS
Asthma and Physical Activity in the School: Making a Difference – 148

CIRCUIT BOARDS
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34

CIRCUITS
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
Solving the Quasi-Static Field Model of the Pulse-Line Accelerator; Relationship to a Circuit Model – 267

Triple Circuit Turbine Blade – 35

CIRCULATION
Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

CITIES
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134
Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120
Urban Battlespace Control: A New Concept for Battle Command – 135

CIVIL AVIATION
Age 60 Aviation Rulemaking Committee: Report to the Federal Aviation Administration, November 29, 2006 – 5
The Civil Reserve Air Fleet: A Vulnerable National Asset – 16

CLASSIFICATIONS
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150
Classification of Targets Using Optimized ISAR Euler Imagery – 74
Coarse Coding for Material and Object Identification – 245
Exploitation of ISAR Imagery in Euler Parameter Space – 74
IAM Slutrapport 2005 (IAM Annual Report 2005) – 278
On the Prompt Gamma-ray Emission Properties of Short GRBs – 316
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
Tandem Learning: A Learning Framework for Document Categorization – 295
Tissue Tracking: Applications for Brain MRI Classification – 281

CLASSIFIERS
Entropy Based Classifier Combination for Sentence Segmentation – 78
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

CLIMATE CHANGE
NOAA’s National Climatic Data Center Annual Report, 2005 – 156
The NASA Orbiting Carbon Observatory – 310

CLIMATE MODELS
Challenges to modeling the Sun-Earth System: A Workshop Summary – 158

- Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site – 131
- CLIMATE**
NOAA's National Climatic Data Center Annual Report, 2005 – 156
- CLIMATOLOGY**
NOAA's National Climatic Data Center Annual Report, 2005 – 156
- CLOUD COVER**
Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 138
- CLOUDS (METEOROLOGY)**
Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site – 132
- CLUTTER**
Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 137
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- COAL**
Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66
- COANDA EFFECT**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115
- COASTS**
Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region – 286
- COATINGS**
FPI and MPI of Cracks Under Coatings – 42
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – 57
- COATING**
Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – 57
- CODE DIVISION MULTIPLE ACCESS**
Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 103
- CODES**
Batch Proving and Proof Scripting in PVS – 213
- CODING**
A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams – 255
- Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224
- Coarse Coding for Material and Object Identification – 245
- Identification Coding Schemes for Modulated Reflectance Systems – 97
- Randomized Distributed Network Coding – 76
- COGNITION**
A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209
Cognitive Constructs and the Sensemaking Process – 86
Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81
Structure Mapping in Visual Displays for Decision Support – 300
- COHERENT RADIATION**
Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56
- COLLECTION**
CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 122
The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321
- COLLIMATION**
Beam Transport Lines for the BSNS – 291
- COLLISION AVOIDANCE**
Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- COLLISIONS**
Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36
- COLLOCATION**
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 309
- COLOMBIA**
In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 84
- COLOR VISION**
Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13
- COLORADO**
Hydrostratigraphic Framework of the Raton, Vermejo, and Trinidad Aquifers in the Raton Basin, Las Animas County, Colorado – 211
- COLOR**
Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13
- COMBAT**
An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 9
Effective USAF Air Traffic Control to Support Proposed Phase IV Operations – 13
Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299
Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229
Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260
Representing the Human Decision Maker in Combat Identification – 298
The Role of Ontology in System-of-Systems Acquisition – 300
Transforming the Structure of the Military: Combat Decisions -- Rank, Responsibility, or Frontline Position? – 89
- COMBINATORIAL ANALYSIS**
Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- COMBUSTION CHAMBERS**
Emissions Control in Swirl Stabilized Spray Combustors, an Experimental and Computational Study – 75
Emissions Control in Swirl-Stabilized Combustors – 125
Unsteady Motions in Combustion Chambers for Propulsion Systems – 113
- COMBUSTION PHYSICS**
Microgravity Effects on Combustion of Polymers – 69
- COMBUSTION PRODUCTS**
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 144

COMBUSTION

A Microwave-Augmented Plasma Torch Module – 287

Fast Prediction of HCCI Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127

Unsteady Motions in Combustion Chambers for Propulsion Systems – 113

Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53

COMET NUCLEI

Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317

COMETS

Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 321

Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317

COMMAND AND CONTROL

A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209

A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252

A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225

A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238

A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2 – 301

A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241

Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224

Agile and Resilient Hierarchies for Defense Departments: Lofty Ideal or an Actionable Proposal – 302

Agile Assessment Techniques for Evaluating Mission Capability Portfolio Ensembles in Complex Adaptive Architectures – 234

An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 301

Analyzing Decisions and Characterizing Information in C2 Systems – 305

Assessing Self Organization and Emergence in C2 Processes – 307

Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82

Battle of the Bulge: The Impact of Information Age Command and Control on Conflict – 82

C2 in the Joint Task Force (JTF) Enterprise – 91

C2 Policy Panel: Under the Avalanche, Which Way Is Up? – 85

C2 Policy: What's it for? – 85

Centralized Command and Control of Theater Missile Defense: The Joint Force Missile Defense Component Coordinator – 86

Collaborative Awareness: Experiments with Tools for Battle Command – 257

Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79

Control Reconfiguration of Command and Control Systems – 92

Director of Space Forces: Refocused for the Way Ahead – 26

Enabling Effective Decisions – 239

Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262

Executable Architectures for Modeling Command and Control Processes – 241

FORCEnet Net Centric Architecture - A Standards View – 239

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209

Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304

In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 83

Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168

Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79

Interagency Cooperation, Is It Enough to Achieve Unity of Effort?: Command and Control Concepts for the Homeland Maritime Domain – 87

JCAS: Psst, the 'J' Stands for Joint – 88

Maintaining Situational Awareness in Large, Complex Organizations – 297

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81

Model-Based Organization Analysis and Design for an ESG Organization – 258

Modeling Intelligent C2 Using Technology of Multi-Agent – 83

Modeling Performance in C4ISR Sustained Operations: A Mult-level Approach – 196

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7

National Command Capability (NCC): Design for a Collaboration Architecture – 243

Net-Centric Pub/Sub Information Management Design for Command and Control – 225

Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296

New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228

Operational Command and Control for Information Operations – 303

Organizational Change for Improved C2 in the Information Age – 84

Radio Path Prediction Software for Command and Control Scenario Developers – 259

Reconfiguring Logistics Command and Control for the 21st Century – 87

Soldier Performance Issues in C2 'On the Move' – 88

Space Dependence - A Critical Vulnerability of the Net-Centric Operational Commander – 28

Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace – 80

The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts) – 240

The Impact of Synchronous Text-Based Chat on Military Command and Control – 81

The Implications of Complex Adaptive Systems Theory for C2 – 81

The Knowledge Structure of the Commander in Asymmetric Battlefield: The Six Sights and Sensemaking Process – 92

The Proliferation Security Initiative: Cooperative Process or Command and Control Nightmare? – 88

The Role of Meta-Information in C2 Decision-Support Systems – 298

The Role of Ontology in System-of-Systems Acquisition – 300

– 83

- Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- Transitioning Research Concepts to the Command and Control Community Quickly – 80
- Validating DoD Architectures: The Promise of Systems Engineering – 239
- Visible Battle Rhythm – 209
- What Force and Metrics for What End - Characterizing the Future Leadership and Force – 83
- Who Pushes the Pickle Button – 8
- COMMERCE**
- Federal Aviation Administration, Office of Airports (ARP) Business Plan, 2007 – 4
- Strategies for Defeating Commercial Imagery Systems – 27
- The Emerging Importance of Business Process Standards in the Federal Government – 226
- COMMERCIAL AIRCRAFT**
- The Civil Reserve Air Fleet: A Vulnerable National Asset – 16
- COMMERCIALIZATION**
- Transitioning Research Concepts to the Command and Control Community Quickly – 80
- COMMUNICATION EQUIPMENT**
- Hybrid-Phased Communication Array – 107
- COMMUNICATION NETWORKS**
- A Robust Scalable Transportation System Concept – 237
- A System Shock Approach to Modelling Clandestine Network Disruption – 78
- Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward – 84
- An Operational Framework for Battle in Network Space – 24
- Keeping an Operational Perspective in a Network-Centric World – 93
- National Command Capability (NCC): Design for a Collaboration Architecture – 243
- Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 195
- Net-Centric, Enterprise-Wide System-of-Systems Engineering and the Global Information Grid – 260
- Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238
- Network Centric Warfare - Death or Renaissance of the Operational Art and the Operational Level of War – 241
- Network-Centric Operations: Challenges and Pitfalls – 242
- Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle – 90
- Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN) – 237
- Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157
- Transforming the Structure of the Military: Combat Decisions -- Rank, Responsibility, or Frontline Position? – 89
- COMMUNICATION**
- Bridging the Divide between Safety and Risk Management for your Project or Program – 292
- Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool – 11
- COMPACTING**
- Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- COMPLEX SYSTEMS**
- Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 219
- Sustainable, Reliable Mission-Systems Architecture – 242
- The Implications of Complex Adaptive Systems Theory for C2 – 81
- Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- COMPOSITE MATERIALS**
- Durable Wood Composites for Naval Low-Rise Buildings – 49
- Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 69
- Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327
- Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- COMPOSITE STRUCTURES**
- Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49
- COMPOSITE WRAPPING**
- Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
- Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- COMPRESSIBLE FLOW**
- SUPG Finite Element Simulations of Compressible Flows – 113
- COMPRESSING**
- Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 198
- COMPTON EFFECT**
- Inclusive and Exclusive Compton Processes in Quantum Chromodynamics – 277
- COMPUTATIONAL FLUID DYNAMICS**
- CFD Modeling Activities at the NASA Stennis Space Center – 113
- Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 2
- Experimental Investigation and Numerical Predication of a Cross-Flow Fan – 112
- Progress Toward Improving Jet Noise Predictions in Hot Jets – 278
- Smoothed Particle Hydrodynamics: Applications Within DSTO – 116
- The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- COMPUTATION**
- The Vision Problem: Exploiting Parallel Computation – 245
- COMPUTER AIDED DESIGN**
- Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 131
- COMPUTER AIDED MANUFACTURING**
- Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 131
- COMPUTER ASSISTED INSTRUCTION**
- AOC Embedded Performance Measurement and Assessment – 228
- Exploring the Relationship Between Distributed Training, Integrated Learning Environments, and Immersive Training Environments – 247
- COMPUTER DESIGN**
- HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209
- COMPUTER GRAPHICS**
- Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213
- COMPUTER INFORMATION SECURITY**
- How Far Can You Trust A Computer? – 235
- On Access Checking in Capability-Based Systems – 235
- Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216
- Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109

COMPUTER NETWORKS

An Operational Framework for Battle in Network Space – 25

Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252

Computer Network Attack and Its Effectiveness against Non-State Actors – 242

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296

Dynamic Defensive Posture for Computer Network Defence – 234

MuVAL Extensions for Dynamic Asset Protection – 234

Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296

Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238

Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation – 212

Network-Centric Operations: Challenges and Pitfalls – 242

Optimizing Information Operations for the New Maritime Strategy – 303

Randomized Distributed Network Coding – 76

The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems – 221

XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244

COMPUTER PROGRAMMING

Automatic Generation of State Invariants from Requirements Specifications – 216

Computational Science: Ensuring America's Competitiveness – 217

FPGAs and HPC – 227

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

Increasing Assurance with Literate Programming Techniques – 295

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

Process Improvement in a Radically Changing Organization – 216

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) – 221

Software Development Cost Estimation Executive Summary – 256

Specification for Visual Requirements of Work-Centered Software Systems – 223

The Cassini-Huygens Sequence Development Process – 310

COMPUTER PROGRAMS

Accelerator Physics Code Web Repository – 268

Advantages of the Program-Based Logbook Submission GUI at Jefferson Lab – 271

Automatic Generation of State Invariants from Requirements Specifications – 216

Built But Not Used, Needed But Not Built: Ground System Guidance Based On Cassini-Huygens Experience – 219

Construction of Protograph LDPC Codes with Linear Minimum Distance – 218

Cooperative Autonomous Mobile Robots – 228

Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices – 222

Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220

Engineering Model for Design of Explosive Fragmentation Munitions – 222

Extraction and Rendering Techniques for Digital Charting Databases – 136

Improvements to NASA's Debris Assessment Software – 215

In-Space Crew-Collaborative Task Scheduling – 248

Integrated, Kerberized Login on MacOS X – 221

NASA Software Estimating Tool (N-SET) – 218

New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228

Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213

Visible Battle Rhythm – 209

COMPUTER SECURITY

Technical and Economic Assessment of Internet Protocol Version 6 (IPv6) – 213

COMPUTER SYSTEMS DESIGN

Acceleration Physics Code Web Repository – 237

COMPUTER SYSTEMS PROGRAMS

NASA's Software Safety Standard – 231

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

Process Improvement in a Radically Changing Organization – 216

Sustainable, Reliable Mission-Systems Architecture – 242

COMPUTER VIRUSES

Review of Existing Wormhole Attack Discovery Techniques – 235

COMPUTER VISION

Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246

The Vision Problem: Exploiting Parallel Computation – 245

COMPUTERIZED SIMULATION

A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 233

A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253

Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233

Computational Science: Ensuring America's Competitiveness – 217

Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 113

Fidelity versus Cost and Its Effect on Modeling and Simulation – 227

Intent Driven Adversarial Modeling – 261

Model-Based Organization Analysis and Design for an ESG Organization – 258

Scenario Generation to Support Mission Planning – 226

Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232

The SWANSURF Wave Model Implementation and User Manual – 221

XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244

COMPUTERS

Computational Science: Ensuring America's Competitiveness – 217

How Far Can You Trust A Computer? – 235

CONCRETE STRUCTURES

Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 70

CONFERENCES

European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 319

Interactive Pit Lakes 2004 Conference (on CD-ROM) – 294

- International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006 – 42
- LISA-The Library and Information Services in Astronomy Conferences – 315
- National Environmental Laboratory Accreditation Conference. Constitution, Bylaws, and Standards Approved July 1998 – 38
- Proceedings of the International Symposium on Advanced Radio Technologies. Held in Boulder, Colorado on February 26-28, 2007 – 77
- Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995 – 51
- The Communications of Influence through Technology-Enabled Media – 76
- CONFIGURATION MANAGEMENT**
Integrated, Kerberized Login on MacOS X – 221
- CONJUGATION**
Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – 68
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167
- CONSERVATION LAWS**
High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263
- CONSTRUCTION**
Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163
Finding the Right Measures of Effectiveness for Rebuilding the State of Iraq – 130
- CONTAMINANTS**
Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 146
- CONTAMINATION**
Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices – 222
Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- CONTINGENCY**
Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- CONTINUOUS RADIATION**
Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- CONTINUUM MECHANICS**
An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290
- CONTINUUMS**
An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290
QCD Thermodynamics with $N(\text{sub } f)=2+1$ Near the Continuum Limit at Realistic Quark Masses – 275
- CONTRACT MANAGEMENT**
NASA's System for Tracking Foreign Contracts and Subcontracts – 24
- CONTROL EQUIPMENT**
Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3
- CONTROL SYSTEMS DESIGN**
International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 32
- CONTROL THEORY**
Control Reconfiguration of Command and Control Systems – 92
Interagency Cooperation, Is It Enough to Achieve Unity of Effort?: Command and Control Concepts for the Homeland Maritime Domain – 87
- CONTROLLERS**
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257
- CONVECTION**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- CONVERGENCE**
Improving Interpolation in BoomerAMG – 213
- CONVERTERS**
Control of Dual-Opposed Stirling Converters with Active Power Factor Correction Controllers – 101
- CONVULSIONS**
A Morpholino Strategy to Assess TSC Gene Function in Zebrafish – 164
- COOLANTS**
A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- COOLING**
Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 116
- COORDINATION**
In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 84
Model-Based Organization Analysis and Design for an ESG Organization – 258
- COPPER ALLOYS**
A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact – 265
- COPPER**
Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66
- CORONAGRAPHS**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- CORONAL MASS EJECTION**
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- CORRECTION**
Control of Dual-Opposed Stirling Converters with Active Power Factor Correction Controllers – 101
- CORRELATION**
Exploitation of ISAR Imagery in Euler Parameter Space – 74
Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report – 102
- CORROSION PREVENTION**
Method for Testing Properties of Corrosive Lubricants – 41
- CORROSION RESISTANCE**
Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 54
Selection of Corrosion Resistant Materials for Nuclear Waste Repositories – 59
- CORROSION**
Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64

Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18

Method for Testing Properties of Corrosive Lubricants – 41

System and Method for Corrosion Maintenance Scheduling – 62

System and Method of Use for Electrochemical Measurement of Corrosion – 65

COSMOLOGY

A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 316

The Birth of Planetary Systems – 309

COST ANALYSIS

Software Development Cost Estimation Executive Summary – 256

COST EFFECTIVENESS

Automatic Generation of State Invariants from Requirements Specifications – 216

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137

Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

Software Development Cost Estimation Executive Summary – 256

COST ESTIMATES

NASA Software Estimating Tool (N-SET) – 218

Software Development Cost Estimation Executive Summary – 256

COST REDUCTION

Fidelity versus Cost and Its Effect on Modeling and Simulation – 227

COSTS

Fidelity versus Cost and Its Effect on Modeling and Simulation – 227

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

COULOMB COLLISIONS

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312

COUNTERFLOW

The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117

COUNTERMEASURES

Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199

Strategies for Defeating Commercial Imagery Systems – 27

COUPLED MODES

Coupled Groups of g-Modes in a Sun with Mixed Core – 327

Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122

Workshop: Theory and Applications of Coupled Cell Networks – 256

COVARIANCE

Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – 31

CP VIOLATION

Intense Neutrino Beams and Leptonic CP Violation – 292

CRACK PROPAGATION

Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration – 16

FPI and MPI of Cracks Under Coatings – 42

CRACKS

FPI and MPI of Cracks Under Coatings – 42

Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32

CRATERS

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 152

Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320

Interiors of Enceladus and Rhea – 314

SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321

CRAY COMPUTERS

CAISSON: Interconnect Network Simulator – 237

CREEP PROPERTIES

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quarterly Technical Progress Report July 1-September 30, 2006 – 60

CREW EXPLORATION VEHICLE

Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – 32

Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20

CREW PROCEDURES (INFLIGHT)

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 22

CRITICAL LOADING

Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129

CROSS FLOW

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quarterly Technical Progress Report July 1-September 30, 2006 – 60

Experimental Investigation and Numerical Prediction of a Cross-Flow Fan – 112

CROSSTALK

ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182

CRUDE OIL

War without Oil: A Catalyst for True Transformation – 136

CRYOGENIC EQUIPMENT

NASA's Spitzer Space Telescope's Operational Mission Experience – 314

CRYOSTATS

NASA's Spitzer Space Telescope's Operational Mission Experience – 314

CRYPTOGRAPHY

A Logical Language for Specifying Cryptographic Protocol Requirements – 245

Formal Requirements for Key Distribution Protocols – 238

Review of Existing Wormhole Attack Discovery Techniques – 235

The NRL Protocol Analyzer: An Overview – 245

CRYSTALLINITY

Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 291

CRYSTALLIZATION

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

High Throughput Screening of Crystallization of Materials – 44

CRYSTALLOGRAPHY

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

CRYSTALS

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

Formulation of a Crystal Plasticity Model – 63

Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

Silver Crystals Through Tollen's Reaction – 44

CUES

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

CULTURE TECHNIQUES

High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 180

CURING

Castable and High Modulus Acoustic Dampening Material – 306

No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 59

CURVATURE

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65

CUTTING

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124

CYBERNETICS

Situation Awareness for Cyber Defense – 301

CYLINDRICAL BODIES

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127

CYTOLOGY

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204

DAMAGE ASSESSMENT

Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 145

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

DAMAGE

Electron-Induced Displacement Damage Effects in CCDs – 328

Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174

Selenoproteins and Prostate Cancer – 170

DATA ACQUISITION

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299

From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge – 217

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 218

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

Spitzer Pre Launch Mission Operations System - The Road to Launch – 314

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

DATA BASE MANAGEMENT SYSTEMS

Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – 294

DATA BASES

A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System – 292

Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266

Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 22

Data Dependence Analysis for an Untrusted Transaction Manager – 295

Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors – 318

Extraction and Rendering Techniques for Digital Charting Databases – 136

Process Improvement in a Radically Changing Organization – 216

Serving Fisheries and Ocean Metadata to Communities Around the World – 293

Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – 294

Update of the Non-State Trunk Inventory – 236

DATA LINKS

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

DATA MANAGEMENT

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Biometric Collection, Transmission and Storage Standards. Version 1.1 – 232

Integrating Geospatial Technologies into the Right-of-Way Data-Management Process: Appendixes A through F – 293

Integrating Geospatial Technologies into the Right-of-Way Data-Management Process – 293

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230

Net-Centric Pub/Sub Information Management Design for Command and Control – 225

DATA PROCESSING EQUIPMENT

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 218

DATA PROCESSING

A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219

Automated Inspection and Processing System – 211

Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216

Tandem Learning: A Learning Framework for Document Categorization – 295

The Role of Meta-Information in C2 Decision-Support Systems – 298

DATA STRUCTURES

Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 267

DATA SYSTEMS

From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge – 217

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 218

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

DATA TRANSMISSION

A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 225

Biometric Collection, Transmission and Storage Standards. Version 1.1 – 232

Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN) – 237

DEATH

Network Centric Warfare - Death or Renaissance of the Operational Art and the Operational Level of War – 241

DEBRIS

Comprehensive Shuttle Foam Debris Reduction Strategies – 50

DECISION MAKING

An Anticipatory Environment Framework – 301

Analyzing Decisions and Characterizing Information in C2 Systems – 305

Command Authority & Information Flows in Net-Centric Operations – 299

Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299

Enabling Effective Decisions – 239

Facilitating Informed Decisionmaking: The E-DEL+I(trademark) Analytic Technique – 248

Filtering and Trust as Tools for the Operational Commander in the Information Age – 304

Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective – 264

Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304

Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168

Metrics for Uncertainty in Organizational Decision-Making – 247

Modeling Performance in C4ISR Sustained Operations: A Multilevel Approach – 196

Network on Target: Remotely Configured Adaptive Tactical Networks – 240

Representing the Human Decision Maker in Combat Identification – 298

DECISION SUPPORT SYSTEMS

Collaborative Awareness: Experiments with Tools for Battle Command – 257

Dynamic Decision Support for Time Critical Targeting – 7

Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F – 293

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133

Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257

Maintaining Situational Awareness in Large, Complex Organizations – 297

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81

Quantification of Subjective Information Assessments in C2 Decision Option Selection – 262

Structure Mapping in Visual Displays for Decision Support – 300

The Role of Meta-Information in C2 Decision-Support Systems – 298

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308

DECISION THEORY

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

DECODERS

Integer Programming Decoder for Machine Translation – 261

DECODING

Construction of Protograph LDPC Codes with Linear Minimum Distance – 218

DECOMPOSITION

Classification of Targets Using Optimized ISAR Euler Imagery – 74

DECOMPRESSION SICKNESS

A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200

Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 197

DEFECTS

Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 285

DEFENSE PROGRAM

Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111

How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security? – 17

Military Role in Space Control: A Primer – 24

Network-Centric Operations: Challenges and Pitfalls – 242

Operationalizing Defense Support to Public Diplomacy – 93

Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259

Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs – 92

Validating DoD Architectures: The Promise of Systems Engineering – 239

War without Oil: A Catalyst for True Transformation – 136

DEFLECTION

Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – 285

Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95

DEGRADATION

Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51

Electron-Induced Displacement Damage Effects in CCDs – 328

Improving Interpolation in BoomerAMG – 213

Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

DEGREES OF FREEDOM

Phonon Enhancement of Electronic and Optoelectronic Devices – 106

DEMODULATION

Joint Demodulation of Low-Entropy Narrowband Cochannel Signals – 119

DEOXYRIBONUCLEIC ACID

DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 181

Examination of Potential Anti-Tumor Activity of N-Thiolated β -Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194

Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109

Selenoproteins and Prostate Cancer – 170

Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

DEPLETION

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145

DEPLOYMENT

Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220

Development of a Passively Deployed Roll-Out Solar Array – 9

Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 149

PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – 246

Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157

DEPOSITS

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149

DERIVATION

Trihydroxy Polyunsaturated Eicosanoid Derivatives – 46

DESCENT

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 22

DESIGN ANALYSIS

A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24

Design and Analysis of Side-Looking Sonar Experiments – 279

Design and Analysis of Thermoplastic Composite Bridge Superstructures – 47

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25

Flocking for Multi-Agent Dynamic Systems: Algorithms and Theory – 249

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33

Spitzer Pre Launch Mission Operations System - The Road to Launch – 314

The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts) – 240

DESORPTION

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report – 53

DESTRUCTION

The Proliferation Security Initiative: Cooperative Process or Command and Control Nightmare? – 88

DESULFURIZING

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – 144

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – 143

DETECTION

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12

Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118

Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective – 264

Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280

Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120

Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165

Microcantilever Sensors for In-Situ Sub-surface Characterization. 2006 ERSD Annual Report – 53

Nanodosimeter Based on Single Ion Detection – 265

Situation Awareness and Fatigue Sensing – 203

Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40

DETECTORS

A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119

High Temperature Characterization of Ceramic Pressure Sensors – 120

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79

Network-Enabled Precision Guided Munitions – 243

T-REX Design Considerations for Detection of Concealed 238U – 268

DETONATION

Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54

One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268

DETONATORS

One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268

DIAGNOSIS

Ethernet Based Embedded System for FEL Diagnostics and Controls – 267

DIAMONDS

Boron-Doped Nanocrystalline Diamond – 97

DIELECTRICS

A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272

Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 273

Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271

DIESEL ENGINES

Fuel Chemistry Impacts in Gasoline HCCI – 146

DIETS

Cellular Targets of Dietary Polyphenol Resveratrol – 54

Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183

FGF Signaling and Dietary Factors in the Prostate – 175

DIFFERENCE EQUATIONS

High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263

DIFFERENTIAL ABSORPTION LIDAR

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

DIFFERENTIAL EQUATIONS

Classification of Targets Using Optimized ISAR Euler Imagery – 74

Exploitation of ISAR Imagery in Euler Parameter Space – 74

DIFFRACTION

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286

DIFFUSION

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

DIGITAL DATA

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

DIGITAL SYSTEMS

Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers – 95

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

DIODES

Hole Transport Layer Compositions and Related Diode Devices – 95

DIRECTION FINDING

Variable Resolution Direction Finding Using the Robust Symmetrical Number System – 104

DISASTERS

Hurricane Katrina: Allocation and Use of \$2 Billion for Medicaid and Other Health Care Needs – 153

Information Fusion for Natural and Man-Made Disasters – 304

Leveraging C2IEDM for Enhancing Systems Interoperability – 151

Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157

DISEASES

Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images – 212

Generation of in Vitro Cellular Models of Lymphangioliomyomatosis for the Development of Tuberosus Sclerosis Therapeutics – 174

Identification of Splice Variants as Molecular Markers in Parkinson's Disease – 184

MPD in Telomerase Null Mice – 165

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174

DISPERSION

The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117

DISPLACEMENT

Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62

Electron-Induced Displacement Damage Effects in CCDs – 328

DISPLAY DEVICES

Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13

Structure Mapping in Visual Displays for Decision Support – 300

Urban Battlespace Control: A New Concept for Battle Command – 135

DISRUPTING

A System Shock Approach to Modelling Clandestine Network Disruption – 78

DISSOCIATION

Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59

Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 123

DISSOLVING

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSO Annual Report – 53

DISTANCE

Robust Estimation of Mahalanobis Distances in Hyperspectral Images – 255

DISTRIBUTED INTERACTIVE SIMULATION

Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227

DISTRIBUTED PARAMETER SYSTEMS

Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220

DISTRIBUTED PROCESSING

A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 233

Flocking for Multi-Agent Dynamic Systems: Algorithms and Theory – 249

Generating Epsilon-Efficient Solutions in Multiobjective Programming – 250

Randomized Distributed Network Coding – 76

XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244

DIURNAL VARIATIONS

Analysis of Particulate Nitrate and Black Carbon Time Series – 142

DIVING (UNDERWATER)

Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 198

DOCUMENT MARKUP LANGUAGES

Leveraging C2IEDM for Enhancing Systems Interoperability – 151

DOMAIN WALL

Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 272

Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270

DOPED CRYSTALS

Boron-Doped Nanocrystalline Diamond – 97

DOSAGE

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327

DOSIMETERS

Intra-Operative Dosimetry in Prostate Brachytherapy – 168

Nanodosimeter Based on Single Ion Detection – 265

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

DOWNLINKING

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

DRAG REDUCTION

Low-Drag Hydrodynamic Surfaces – 115

DRAINAGE

Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 116

Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99

DRONE AIRCRAFT

Intelligent Control Management of Autonomous Air Vehicles – 16

DRONE VEHICLES

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3

How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security? – 17

Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons – 17

Persistent ISR from UAVs: Doctrinal Considerations for Operational Warfare – 18

Pesky Critters – 9

Small Power: The Role of Micro and Small UAVs in the Future – 10

The Way Ahead For Maritime UAVS – 19

DROP SIZE

Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112

DRUGS

Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation – 179

Proteomic Analysis of Cisplatin-Resistant Ovarian Cancers – 173

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendemiddelen in marmosetapen) – 201

Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents – 187

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

DUCTS

Low Leakage Finger Seal – 44

DURABILITY

Durable Wood Composites for Naval Low-Rise Buildings – 49

DUST

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 152

Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320

Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316

Environmental Technology Verification Report: Field Portable X-ray Fluorescence Analyzer. Niton XL Spectrum Analyzer – 141

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320

DYES

Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55

DYNAMIC CONTROL

Modeling Dynamics and Exploring Control of a Single-Wheeled Dynamically Stable Mobile Robot with Arms – 247

DYNAMIC MODELS

A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

Control of Dual-Opposed Stirling Convertors with Active Power Factor Correction Controllers – 100

DYNAMIC RESPONSE

Dynamic Response of an Insonified Sonar Window Interacting with a Tonpilz Transducer Array – 104

DYNAMIC STRUCTURAL ANALYSIS

Acoustic Design of Naval Structures – 279

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

Structure and Dynamics of GRB Jets – 317

Transportation Vibration Analysis of the XM982 Projectile – 278

Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20

DYNAMIC TESTS

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25

EARLY WARNING SYSTEMS

Advanced Road Safety and Weather Warning System (ARSAWWS) – 153

EARTH ATMOSPHERE

3rd IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere System/ Abstract – 150

EARTH IONOSPHERE

International Heliophysical Year SCINDA Workshop/Abstract – 319

EARTH SCIENCES

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 134

NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134

NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

EARTHQUAKES

Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49

ECONOMIC IMPACT

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

ECONOMICS

Technical and Economic Assessment of Internet Protocol Version 6 (IPv6) – 213

EDDY CURRENTS

Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18

Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67

EDUCATION

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138

A Comprehensive Postdoctoral Training Program in Breast Cancer – 190

Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185

Developing Expertise at the Operational-Level of Warfare – 297

Exploring the Relationship Between Distributed Training, Integrated Learning Environments, and Immersive Training Environments – 247

Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1

Interactive Workshop on Arsenic Removal from Drinking Water (on CD-ROM) – 52

Leveraging Simulation Against the F-16 Flying Training Gap – 8

PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – 246

- Undergraduate Summer Training Program in Breast Cancer Imaging – 171
- EJECTA**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- ELASTIC WAVES**
An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253
- ELECTRIC BATTERIES**
81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138
Evaluation of 2005 Honda Accord Hybrid Electric Drive System. FY 2006 – 101
Microscopic Batteries for MEMS Systems – 97
- ELECTRIC CHARGE**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- ELECTRIC DISCHARGES**
Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 274
- ELECTRIC EQUIPMENT**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
- ELECTRIC FIELDS**
Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105
- ELECTRIC GENERATORS**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – 139
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
Micro Magnetic Induction Machines for Portable Power Applications – 139
- ELECTRIC MOTOR VEHICLES**
Evaluation of 2005 Honda Accord Hybrid Electric Drive System. FY 2006 – 102
- ELECTRIC MOTORS**
Evaluation of 2005 Honda Accord Hybrid Electric Drive System. FY 2006 – 102
- ELECTRIC POTENTIAL**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95
- ELECTRIC POWER PLANTS**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 145
Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – 144
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
Micro Magnetic Induction Machines for Portable Power Applications – 139
- ELECTRIC PROPULSION**
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36
- ELECTRICAL ENGINEERING**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25
- ELECTRICAL PROPERTIES**
Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42
- ELECTRICAL RESISTIVITY**
Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- ELECTROCHEMICAL CELLS**
System and Method of Use for Electrochemical Measurement of Corrosion – 65
- ELECTROCHEMICAL CORROSION**
Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52
System and Method of Use for Electrochemical Measurement of Corrosion – 65
- ELECTROCHEMISTRY**
Electrochromic Salts Solutions and Devices – 51
Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- ELECTROCHROMISM**
Electrochromic Salts Solutions and Devices – 51
- ELECTRODES**
Carbon Nanotube Nanoelectrode Arrays – 110
- Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287
- ELECTROLUMINESCENCE**
Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – 68
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- ELECTROLYTES**
Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55
- ELECTROMAGNETIC PULSES**
Electromagnetic Pulse Threats in 2010 – 112
- ELECTROMAGNETIC RADIATION**
H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257
- ELECTROMAGNETIC SCATTERING**
Classification of Targets Using Optimized ISAR Euler Imagery – 74
Exploitation of ISAR Imagery in Euler Parameter Space – 74
- ELECTROMAGNETIC WAVE TRANSMISSION**
Numerical Solution of the Extended Non-linear Schrodinger Equation – 286
- ELECTROMAGNETISM**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
- ELECTROMECHANICAL DEVICES**
Electromechanical Actuators – 108
- ELECTROMIGRATION**
A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact – 265
- ELECTRON BEAMS**
Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271
Upgrading the CEBAF Accelerator to 12 GeV – 289
- ELECTRON BUNCHING**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
- ELECTRON CLOUDS**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- ELECTRON DENSITY (CONCENTRATION)**
Analytical Ion Thruster Discharge Performance Model – 36
Statistical Density Modification Using Local Pattern Matching – 215
- ELECTRON SCATTERING**
Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 291

- Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 268
- ELECTRON STATES**
Quenching Dynamics of Electronically Excited Hydroxyl Radicals – 55
- ELECTRON TUNNELING**
Pseudo Tunnel Junction – 265
- ELECTRONIC EQUIPMENT**
Advantages of the Program-Based Log-book Submission GUI at Jefferson Lab – 271
Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109
Solid State High Power Device and Method – 96
- ELECTRONIC MAIL**
Coordinating Initiation and Response in Computer-Mediated Communication – 240
UMass at TREC 2006: Enterprise Track – 87
- ELECTRONIC STRUCTURE**
Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report – 102
- ELECTRONIC WARFARE**
Optimizing Information Operations for the New Maritime Strategy – 303
- ELECTRO-OPTICAL PHOTOGRAPHY**
Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120
- ELECTRO-OPTICS**
Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – 68
Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- ELECTROSTATIC GYROSCOPES**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
Model-Based Organization Analysis and Design for an ESG Organization – 258
- ELECTROSTATICS**
Analytical Ion Thruster Discharge Performance Model – 36
- ELECTROSTRICTION**
Electromechanical Actuators – 108
- ELECTROWEAK INTERACTIONS (FIELD THEORY)**
Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 272
- ELLIPTICAL ORBITS**
Rendezvous and Proximity Operations of the Space Shuttle – 37
- ELONGATION**
Elongated Nano-Structures and Related Devices – 38
- EMBEDDING**
AOC Embedded Performance Measurement and Assessment – 228
Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169
- EMERGENCIES**
Command World – 80
Information Fusion for Natural and Man-Made Disasters – 304
Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 195
Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157
Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157
- EMISSION**
Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57
- EMISSIONIVITY**
Emissive Sensors and Devices Incorporating These Sensors – 96
- EMOTIONAL FACTORS**
Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166
- EMOTIONS**
Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166
- ENCELADUS**
Interiors of Enceladus and Rhea – 314
- ENDOCRINOLOGY**
Endocrine Therapy of Breast Cancer – 183
- ENERGY CONSERVATION**
Analytical Ion Thruster Discharge Performance Model – 36
High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69
- ENERGY CONVERSION**
Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55
- ENERGY TRANSFER**
On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- ENTROPY**
Entropy Based Classifier Combination for Sentence Segmentation – 78
Joint Demodulation of Low-Entropy Narrowband Cochannel Signals – 119
- ENVIRONMENT MANAGEMENT**
Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F – 293
- ENVIRONMENT MODELS**
New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148
- ENVIRONMENT PROTECTION**
Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148
- ENVIRONMENTAL CLEANUP**
Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- ENVIRONMENTAL LABORATORIES**
National Environmental Laboratory Accreditation Conference. Constitution, By-laws, and Standards Approved July 1998 – 38
- ENVIRONMENTAL MONITORING**
Microcantilever Sensors for In-Situ Sub-surface Characterization. 2006 ERSD Annual Report – 53
National Environmental Laboratory Accreditation Conference. Constitution, By-laws, and Standards Approved July 1998 – 38
- ENVIRONMENTAL SURVEYS**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 145
- ENZYME ACTIVITY**
Enzymatic Template Polymerization – 40
Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189
- ENZYMES**
Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162

- Enzymatic Template Polymerization – 40
- Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation – 178
- EPIDEMIOLOGY**
- Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168
- EPITHELIUM**
- Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 194
- Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – 167
- Molecular Characterization of Squamous Cell Carcinomas From Recessive Dysplastic Epidermolysis Bullosa – 194
- Role of TGF-beta in Prostate Cancer Progression – 171
- Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162
- EPOXY RESINS**
- Castable and High Modulus Acoustic Dampening Material – 306
- Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 69
- EQUATIONS OF STATE**
- Constraints on the Grueneisen Theory – 253
- EQUIPMENT**
- Waveguide Apparatus and Method – 94
- ERYTHROCYTES**
- MPD in Telomerase Null Mice – 165
- ESTIMATES**
- On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327
- Optimal Integration of Estimation and Guidance for Interceptors – 251
- Robust Estimation of Mahalanobis Distances in Hyperspectral Images – 255
- ESTIMATING**
- Estimating Emissions Associated with Portable Fuel Containers (PFCs) – 140
- Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274
- Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 108
- NASA Software Estimating Tool (N-SET) – 218
- Optimal Integration of Estimation and Guidance for Interceptors – 251
- ESTROGENS**
- Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180
- Development of a Computational Assay for the Estrogen Receptor – 179
- Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Pre-menopausal Women – 189
- Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167
- Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – 179
- ETHERNET**
- Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Performance Evaluation of 'SRFS on Ether' on the Internet – 76
- ETHERS**
- Performance Evaluation of 'SRFS on Ether' on the Internet – 77
- ETHICS**
- Space Exploration: Challenges in Medicine, Research, and Ethics – 205
- ETIOLOGY**
- Enhancing the Immune Response to Recombinant Plague Antigens – 195
- EUROPEAN SPACE AGENCY**
- International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- EUROPEAN UNION**
- Greenhouse Gas Emissions Trading for the Transport Sector – 148
- EVALUATION**
- Advanced Visualization for Operational Assessment (Briefing Charts) – 258
- Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- Comparing Evaluation Metrics for Sentence Boundary Detection – 74
- Evaluations of QMI After-Market Additives – 7
- Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
- New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
- Performance Evaluation of 'SRFS on Ether' on the Internet – 76
- Service Assessment: Hurricane Katrina, August 23-31, 2005 – 155
- Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 119
- Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120
- Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127
- Transportation Vibration Analysis of the XM982 Projectile – 278
- EVAPORATION**
- Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir – 277
- EXCITATION**
- The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2
- EXHAUST EMISSION**
- Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
- Development of a Cummins Westport SI-EGR Natural Gas Engine at 0.2 g/bhp-hr. February 2, 2005-July 31, 2006 – 126
- Greenhouse Gas Emissions Trading for the Transport Sector – 148
- On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147
- EXHAUST GASES**
- Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40
- Greenhouse Gas Emissions Trading for the Transport Sector – 148
- EXHAUST SYSTEMS**
- Low Leakage Finger Seal – 44
- EXPERIMENT DESIGN**
- Experiments into the Operation and Effectiveness of Edge Organizations – 91
- Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- EXPLOITATION**
- An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
- Exploitation of ISAR Imagery in Euler Parameter Space – 74
- Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- EXPLOSIVE DEVICES**
- Improved Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – 244
- EXPLOSIVES DETECTION**
- Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123

- Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – [244](#)
- EXPLOSIVES**
- Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – [255](#)
- Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – [166](#)
- Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – [154](#)
- User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – [230](#)
- EXPOSURE**
- Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – [328](#)
- Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – [169](#)
- EXTRACTION**
- 81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – [138](#)
- Extraction and Rendering Techniques for Digital Charting Databases – [136](#)
- Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – [213](#)
- Silica Extraction at the Mammoth Lakes Geothermal Site – [67](#)
- EXTRASOLAR PLANETS**
- Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – [284](#)
- Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – [315](#)
- EXTRATERRESTRIAL LIFE**
- Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – [313](#)
- EXTRATERRESTRIAL RADIATION**
- Chromosome Aberrations in Astronauts – [203](#)
- Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – [328](#)
- On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – [327](#)
- EXTRAVEHICULAR ACTIVITY**
- Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – [201](#)
- Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – [204](#)
- EXTREME ULTRAVIOLET RADIATION**
- EUV Testing of Multilayer Mirrors: Critical Issues – [275](#)
- EXTREMELY HIGH FREQUENCIES**
- Classification of Targets Using Optimized ISAR Euler Imagery – [74](#)
- Exploitation of ISAR Imagery in Euler Parameter Space – [74](#)
- Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – [73](#)
- R.F. Microphotonics for NASA Space Communications Applications – [31](#)
- EYE (ANATOMY)**
- Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – [209](#)
- EYE MOVEMENTS**
- Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – [209](#)
- F-16 AIRCRAFT**
- Leveraging Simulation Against the F-16 Flying Training Gap – [8](#)
- FABRICATION**
- Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – [283](#)
- Geopolymers for Structural Ceramic Applications – [68](#)
- High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – [125](#)
- Hybrid-Phased Communication Array – [107](#)
- Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – [61](#)
- Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – [139](#)
- Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – [107](#)
- FABRICS**
- Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – [58](#)
- FACTOR ANALYSIS**
- Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – [246](#)
- FACTORIZATION**
- A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – [253](#)
- FAILURE ANALYSIS**
- Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – [36](#)
- Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – [32](#)
- FAILURE**
- Catastrophic Fault Recovery with Self-Reconfigurable Chips – [215](#)
- Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hangups – [129](#)
- Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – [36](#)
- FANS**
- Experimental Investigation and Numerical Predication of a Cross-Flow Fan – [112](#)
- FAR FIELDS**
- Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – [26](#)
- FAR ULTRAVIOLET RADIATION**
- The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – [280](#)
- FAST FOURIER TRANSFORMATIONS**
- Emissions Control in Swirl-Stabilized Combustors – [125](#)
- FASTENERS**
- Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – [127](#)
- FATIGUE (MATERIALS)**
- Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – [43](#)
- FATTY ACIDS**
- Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – [184](#)
- Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – [40](#)
- FAULT TOLERANCE**
- Catastrophic Fault Recovery with Self-Reconfigurable Chips – [215](#)
- FEASIBILITY**
- Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – [42](#)
- Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – [57](#)

FEDERAL BUDGETS

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18

FEED SYSTEMS

Bismuth Propellant Feed System Development at NASA-MSFC – 71

FEMALES

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

FERMIONS

Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 272

Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270

FERROELECTRIC MATERIALS

Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103

FERROELECTRICITY

Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103

FERTILIZERS

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Electrocuted While Attempting to Change a Fuse in a Fuse Box Providing Power to a Fertilizer Mixer/Loader – 101

FIBER COMPOSITES

Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads – 50

Design and Analysis of Thermoplastic Composite Bridge Superstructures – 47

Geopolymers for Structural Ceramic Applications – 68

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47

FIBERS

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56

FIBROSIS

Preclinical Mouse Models of Neurofibromatosis – 191

FIELD TESTS

Trials Lessons Learned: DRDC Ottawa Propagation Measurements and Support for DLCSPM Trials 9-10 January 06 – 76

FIELD THEORY (PHYSICS)

Calculation of the nucleon axial charge in lattice QCD – 270

FIELD-PROGRAMMABLE GATE ARRAYS

Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34

Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100

FIGHTER AIRCRAFT

Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3

Joint Strike Fighter Across the Atlantic: To Unify or Divide – 14

FILAMENT WINDING

Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 49

FILLERS

Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64

FILTRATION

Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 114

FINANCIAL MANAGEMENT

Airport Improvement Program: Issues for Congress – 23

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

FINITE DIFFERENCE THEORY

High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263

FINITE ELEMENT METHOD

SUPG Finite Element Simulations of Compressible Flows – 113

FIRES

Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166

FISHERIES

Serving Fisheries and Ocean Metadata to Communities Around the World – 294

FISHES

Summary of Survival Data from Juvenile Coho Salmon in the Klamath River, Northern California, 2006 – 256

FLAME HOLDERS

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114

FLAME PROPAGATION

Effects of Finite Sample Width on Transition and Flame Spread in Microgravity – 70

FLAMMABILITY

Exploration Life Support: ELS Functions and Materials Interfaces – 207

FLAPPING

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3

FLAT PANEL DISPLAYS

Method for Making Sol Gel Spacers for Flat Panel Displays – 95

FLAVOR (PARTICLE PHYSICS)

Search for Pentaquarks with CLAS – 272

FLEXIBILITY

No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 60

FLEXING

Double Hidden Flexure Microactuator for Phase Mirror Array – 98

FLEXORS

The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198

FLIGHT CHARACTERISTICS

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33

FLIGHT CONTROL

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114

Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 3

FLIGHT CREWS

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124

Causes and Effects of Fatigue in Experienced Military Aircrew – 6

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

Summary of the Science performed onboard the International Space Station during Increments 12 and 13 – 309

FLIGHT MANAGEMENT SYSTEMS

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 22

FLIGHT OPERATIONS

The Cassini-Huygens Mission Overview – 312

FLIGHT RULES

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218

- The Cassini-Huygens Sequence Development Process – [310](#)
- FLIGHT SAFETY**
Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – [32](#)
- FLIGHT SIMULATION**
Leveraging Simulation Against the F-16 Flying Training Gap – [8](#)
- FLIGHT TESTS**
Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System – [14](#)
- FLIGHT TRAINING**
Leveraging Simulation Against the F-16 Flying Training Gap – [8](#)
- FLOODS**
Use and Benefits of the National Weather Service River and Flood Forecasts – [155](#)
- FLOW MEASUREMENT**
Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – [313](#)
- FLOW STABILITY**
Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – [32](#)
- FLOW VISUALIZATION**
Advanced Visualization for Operational Assessment (Briefing Charts) – [258](#)
- FLOW**
Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – [307](#)
- FLUE GASES**
Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – [144](#)
Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – [143](#)
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – [146](#)
- FLUID DYNAMICS**
Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – [115](#)
- FLUID FLOW**
Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – [32](#)
Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – [113](#)
- FLUID MECHANICS**
Fast Prediction of HCCI Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – [127](#)
Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – [264](#)
- FLUORESCENCE**
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – [167](#)
- FLURO COMPOUNDS**
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – [45](#)
- FLUTTER**
Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – [3](#)
- FLY ASH**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – [145](#)
Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – [143](#)
- FLYBY MISSIONS**
Interiors of Enceladus and Rhea – [314](#)
- FOCAL PLANE DEVICES**
Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – [280](#)
- FOOD PRODUCTION (IN SPACE)**
Human Research Program: Space Human Factors and Habitability Element – [210](#)
- FORECASTING**
Advanced Road Safety and Weather Warning System (ARSAWWS) – [153](#)
Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report – [121](#)
Identifying Potential Implications of Technologies on Military and Security Options – [261](#)
The NASA Orbiting Carbon Observatory – [310](#)
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – [308](#)
Use and Benefits of the National Weather Service River and Flood Forecasts – [155](#)
- FOREIGN POLICY**
Gauging U.S.-Indian Strategic Cooperation – [281](#)
- FORESTS**
Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – [138](#)
- FORKS**
High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – [126](#)
- FORM FACTORS**
Precision Measurement of the Charged Pion Form and Factor – [276](#)
- FORMAT**
Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – [214](#)
- FORTRAN**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – [223](#)
- FOSSIL FUELS**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – [145](#)
Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – [144](#)
Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee – [143](#)
Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – [144](#)
Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – [143](#)
Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – [143](#)
Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4 – [142](#)
- FOSSILS**
Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee – [143](#)
Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – [143](#)
Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4 – [142](#)

FOURIER SERIES

An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253

FOURIER TRANSFORMATION

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 280

FRACTURE MECHANICS

MOSSFRAC: An Anisotropic 3D Fracture Model – 43

FRACTURES (MATERIALS)

Interiors of Enceladus and Rhea – 314

Overuse Injury Assessment Model – 202

FRACTURING

MOSSFRAC: An Anisotropic 3D Fracture Model – 43

FRAGMENTATION

Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – 328

Engineering Model for Design of Explosive Fragmentation Munitions – 222

FREE ELECTRON LASERS

Ethernet Based Embedded System for FEL Diagnostics and Controls – 267

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286

FREE FLOW

The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117

FREE-PISTON ENGINES

Control of Dual-Opposed Stirling Converters with Active Power Factor Correction Controllers – 101

FREE-SPACE OPTICAL COMMUNICATION

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

FREQUENCIES

Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123

FREQUENCY MODULATION

Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22

FREQUENCY SHIFT

Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29

FUEL INJECTION

Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Post-print) – 114

FUEL-AIR RATIO

Emissions Control in Swirl Stabilized Spray Combusters, an Experimental and Computational Study – 75

FUELS

Aging Properties of An HTPB Propellant – 261

Air Force Journal of Logistics. Volume 30, Number 3, Fall 2006 – 71

Emissions Control in Swirl-Stabilized Combusters – 125

FUNGI

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 161

FUSION REACTORS

Development of the Butt Joint for the ITER Central Solenoid – 274

GALERKIN METHOD

SUPG Finite Element Simulations of Compressible Flows – 113

GALILEO SPACECRAFT

Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323

GALLIUM ARSENIDES

Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326

GALLIUM PHOSPHIDES

Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326

GALLIUM

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

GAMMA RAY BURSTS

On the Prompt Gamma-ray Emission Properties of Short GRBs – 317

Structure and Dynamics of GRB Jets – 317

GAMMA RAY OBSERVATORY

On the Prompt Gamma-ray Emission Properties of Short GRBs – 317

GAMMA RAYS

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138

GAPS

The Evolution of Airpower Theory and Future Air Strategies for Employment in the Gap – 8

GAS DETECTORS

Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45

GAS DISCHARGES

Microdischarge Sources of O₂(singlet Delta) – 288

GAS FLOW

Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2

GAS GENERATORS

Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114

GAS INJECTION

Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126

GAS POCKETS

Low-Drag Hydrodynamic Surfaces – 115

GAS TURBINE ENGINES

Turbine Engine disk Spacers – 21

Turbine Engine Rotor Retainer – 21

GAS TURBINES

Emissions Control in Swirl Stabilized Spray Combusters, an Experimental and Computational Study – 75

GASEOUS FUELS

Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126

GASOLINE

Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40

Fuel Chemistry Impacts in Gasoline HCCI – 146

GATES (CIRCUITS)

Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34

GELS

Nanostructured Magnetorheological Fluids and Gels – 39

GENE EXPRESSION

Anticancer Inhibitors of AR-Mediated Gene Expression – 172

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197

Targeting Mechanisms of Resistance to Taxane-Based Chemotherapy – 159

GENE THERAPY

Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – 167

GENERAL AVIATION AIRCRAFT

State Department: State Has Initiated a More Systematic Approach for Managing Its Aviation Fleet – 20

GENERAL OVERVIEWS

Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks – 307

GENESIS MISSION

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

GENES

A Morpholino Strategy to Assess TSC Gene Function in Zebrafish – 164

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

FGF Signaling and Dietary Factors in the Prostate – 175

Generation of in Vitro Cellular Models of Lymphangioliomyomatosis for the Development of Tuberous Sclerosis Therapeutics – 174

Genes Involved in Oxidation and Prostate Cancer Progression – 186

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

GENETIC ALGORITHMS

From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 254

GENETICS

Generation of in Vitro Cellular Models of Lymphangioliomyomatosis for the Development of Tuberous Sclerosis Therapeutics – 174

Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161

Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons – 17

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165

GENOME

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

GEOCHEMISTRY

Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 323

Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322

Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322

The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321

GEODESY

GPS – 134

GEOLOGICAL SURVEYS

National Geomagnetism Program: Current Status and Five-Year Plan, 2006-2010 – 132

GEOLOGY

Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan – 152

GEOMAGNETISM

National Geomagnetism Program: Current Status and Five-Year Plan, 2006-2010 – 132

GEOPHYSICS

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

GERMANY

Remarks on the New 100-200 Mhz Receiver of the Solar Radio Observatory of the AIP at Tremsdorf Near Potsdam, Germany – 318

GLASS TRANSITION TEMPERATURE

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

GLASS

High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55

GLOBAL POSITIONING SYSTEM

GPS – 134

Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – 31

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 119

Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323

Update of the Non-State Trunk Inventory – 236

GLOBAL WARMING

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

GLONASS

Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323

GRADIENTS

Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271

GRAIN BOUNDARIES

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65

GRAPHICAL USER INTERFACE

Advantages of the Program-Based Logbook Submission GUI at Jefferson Lab – 271

Specification for Visual Requirements of Work-Centered Software Systems – 223

GRAPHITE

Geopolymers for Structural Ceramic Applications – 68

GRAPHS (CHARTS)

Construction of Protograph LDPC Codes with Linear Minimum Distance – 218

GRAVITATIONAL FIELDS

Interiors of Enceladus and Rhea – 314

GRAVITATION

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285

GRAZING

Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 137

GREENHOUSE EFFECT

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

Global-Warming: A National Security Issue – 151

Greenhouse Gas Emissions Trading for the Transport Sector – 148

Role of Renewable Energy in Reducing Greenhouse Gas Buildup. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

The NASA Orbiting Carbon Observatory – 310

GREEN'S FUNCTIONS

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

GROUND EFFECT (COMMUNICATIONS)

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74

GROUND STATIONS

Low-cost Large Aperture Telescopes for Optical Communications – 284

GROUND TESTS

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219

From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge – 217

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELS) – 218

GROUND WATER

Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices – 222

GROUP DYNAMICS

A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302

GUIDANCE (MOTION)

Optimal Integration of Estimation and Guidance for Interceptors – 251

Solar Sail Model Validation from Echo Trajectories – 37

GUIDANCE SENSORS

Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 35

GULF OF MEXICO

NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233

Ocean Mixed Layer Response to Gap Wind Scenarios – 156

GULFS

Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region – 286

GYROSCOPES

High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – 126

GYROTROPISM

Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264

Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115

HABITABILITY

Human Research Program: Space Human Factors and Habitability Element – 210

HABITATS

Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – 294

HADRONS

Hadron Structure from Lattice QCD – 277

Precision Measurement of the Charged Pion Form and Factor – 276

HALE-BOPP COMET

Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316

HALL THRUSTERS

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36

HAMSTERS

Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181

HANDBOOKS

Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F – 293

Quality Assurance Handbook for Air Pollution Measurement Systems. Volume 2. Ambient Air Specific Methods (Interim Edition) – 140

HARMONICS

The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2

Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics – 125

HARNESSES

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25

HASTELLOY (TRADEMARK)

Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52

HAZARDOUS MATERIALS

Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995 – 52

HAZARDS

Assessing the Dangers of Moon Dust – 206

How Far Can You Trust A Computer? – 235

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

HEAD DOWN TILT

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199

HEALTH

A Comprehensive Postdoctoral Training Program in Breast Cancer – 190

Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177

Health Information Technology: Early Efforts Initiated but Comprehensive Privacy Approach Needed for National Strategy – 307

Health-Related Quality of Life for Pediatric NF1 Patients – 171

Hurricane Katrina: Allocation and Use of \$2 Billion for Medicaid and Other Health Care Needs – 153

Innovative Methods for Engine Health Monitoring – 20

International Multidisciplinary Artificial Gravity (IMAG) Project – 199

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174

HEARING

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

HEART FUNCTION

Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199

HEART RATE

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

HEART

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199

HEAT EXCHANGERS

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quaterly Technical Progress Report July 1-September 30, 2006 – 60

HEAT FLUX

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127

Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 115

HEAT ISLANDS

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

HEAT MEASUREMENT

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

HEAT RESISTANT ALLOYS

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65

HEAT SHIELDING

Thermal Shield Turbine Airfoil – 2

HEAT TRANSFER

Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report – 267

HEATERS

Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report – 267

HEATING

Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264

HEAVY IONS

QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 269

HELICOPTERS

Joint Helicopter Command: The 'Purple' Evolution of Rotary-Wing Aviation – 19

The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery – 5

HELIOSPHERE

Heliophysics Science Enabled By the Return to the Moon – 325

International Heliophysical Year SCINDA Workshop/Abstract – 319

HELIUM ATOMS

Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 291

HELIUM ISOTOPES

Coupled Groups of g-Modes in a Sun with Mixed Core – 327

HELMETS

Human Neck Response during Vertical Impact with Variable Weighted Helmets – 202

HEMATITE

Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322

HEMATOLOGY

DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 181

Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181

HEMATOPOIETIC SYSTEM

MPD in Telomerase Null Mice – 165

HEURISTIC METHODS

c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61

HIERARCHIES

Agile and Resilient Hierarchies for Defense Departments: Lofty Ideal or an Actionable Proposal – 302

Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations – 305

HIGH ALTITUDE

A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200

Electromagnetic Pulse Threats in 2010 – 111

Lowering the High Ground: Using Near-Space Vehicles for Persistent C3ISR – 9

HIGH CURRENT

Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266

HIGH ENERGY INTERACTIONS

Observation of a Broad Structure at an Invariant Mass of 4.32 GeV in the Reaction e^+e^- to $\pi^+\pi^-\psi(2S)$ Measured at BaBar – 275

HIGH FREQUENCIES

Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3

HIGH PRESSURE

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 39

Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 63

Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53

HIGH RESOLUTION

Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 137

High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – 125

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

The Orbiting Carbon Observatory: Mission Overview – 311

HIGH TEMPERATURE

High Temperature Characterization of Ceramic Pressure Sensors – 120

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38

Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139

Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73

Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr) – 66

HIGH VOLTAGES

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

HIGHWAYS

Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 23

Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads – 49

HOLES (MECHANICS)

Hole Transport Layer Compositions and Related Diode Devices – 95

HOLOGRAPHY

Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 102

Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations – 305

HOMEOSTASIS

FGF Signaling and Dietary Factors in the Prostate – 175

HOMING DEVICES

Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111

HOMOGENEITY

A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 316

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

HOMOGENIZING

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

HOMOLOGY

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181

HONEYCOMB STRUCTURES

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130

HOOPS

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quarterly Technical Progress Report July 1-September 30, 2006 – 60

HORMONES

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – 186

Development of a Computational Assay for the Estrogen Receptor – 179

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

HTPB PROPELLANTS

Aging Properties of An HTPB Propellant – 261

HUMAN BEHAVIOR

Psychological Operations: The Theory of Behavioral Influence – 205

HUMAN FACTORS ENGINEERING

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124

Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – 208

Human Research Program: Space Human Factors and Habitability Element – 210

Operator Site 2004-2005 (Operators-platsen 2004-2005) – 19

Psychological Operations: The Theory of Behavioral Influence – 205

HUMAN PERFORMANCE

Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124

An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – 206

Human Research Program: Space Human Factors and Habitability Element – 210

Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queuing Theory. Part II – 7

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199

HUMAN REACTIONS

Human Neck Response during Vertical Impact with Variable Weighted Helmets – 202

HUMAN-COMPUTER INTERFACE

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209

The Role of Meta-Information in C2 Decision-Support Systems – 298

HURRICANES

Hurricane Katrina: Allocation and Use of \$2 Billion for Medicaid and Other Health Care Needs – 153

Service Assessment: Hurricane Katrina, August 23-31, 2005 – 155

Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157

XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223

HUYGENS PROBE

The Cassini-Huygens Mission Overview – 312

HYDRAULIC TEST TUNNELS

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115

HYDROCARBONS

Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40

HYDRODYNAMICS

Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112

Low-Drag Hydrodynamic Surfaces – 115

Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232

Smoothed Particle Hydrodynamics: Applications Within DSTO – 116

HYDROFOILS

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115

HYDROGEN IONS

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

HYDROGEN PRODUCTION

Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66

HYDROGEN

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138

Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66

Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – 285

Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 63

HYDROMETEOROLOGY

Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158

HYDROPHONES

Method for Real Time Matched Field Processing – 254

HYDROXYL RADICALS

Quenching Dynamics of Electronically Excited Hydroxyl Radicals – 55

HYPERSONIC SPEED

Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 288

HYPERSONIC VEHICLES

Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 4

HYPNOSIS

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 200

IDENTIFYING

Identifying Potential Implications of Technologies on Military and Security Operations – 262

IGNITION

Fuel Chemistry Impacts in Gasoline HCCI – 146

Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272

ILLUMINATING

Lightning Protection System for HE Facilities at LLNL-Certification Template – 155

The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery – 5

ILLUSIONS

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

IMAGE ANALYSIS

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178

IMAGE MOTION COMPENSATION

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

IMAGE PROCESSING

Coarse Coding for Material and Object Identification – 246

Comparative Analysis of Kernel Methods for Statistical Shape Learning – 245

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178

Extraction and Rendering Techniques for Digital Charting Databases – 136

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22

The Vision Problem: Exploiting Parallel Computation – 245

IMAGERY

Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region – 286

Classification of Targets Using Optimized ISAR Euler Imagery – 74

Exploitation of ISAR Imagery in Euler Parameter Space – 74

Hyperspectral Imagery: Warfighting Through a Different Set of Eyes – 280

Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213

Robust Estimation of Mahalanobis Distances in Hyperspectral Images – 255

Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248

Strategies for Defeating Commercial Imagery Systems – 27

IMAGING RADAR

Noise Radar Technology Basics – 118

IMAGING SPECTROMETERS

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 309

IMAGING TECHNIQUES

2006 Interferometry Imaging Beauty Contest – 119

Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118

Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 22

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12

Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123

Integrated Cancer Research in Five Thematic Areas of Interest – 176

Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280

Phantom for Production of Controllable fMRI Signal – 97

Radar Images of Asteroid 100085 (1992 UY4) – 313

Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279

Tissue Tracking: Applications for Brain MRI Classification – 281

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286

Undergraduate Summer Training Program in Breast Cancer Imaging – 171

IMMOBILIZATION

Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166

IMMUNE SYSTEMS

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204

IMMUNITY

Enhancing the Immune Response to Recombinant Plague Antigens – 195

IMMUNOLOGY

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

IMPACT ACCELERATION

Human Neck Response during Vertical Impact with Variable Weighted Helmets – 202

IMPACT DAMAGE

Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317

IMPACT TESTS

Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127

IMPACTORS

Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 321

IMPEDANCE

Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105

System and Method of Use for Electrochemical Measurement of Corrosion – 65

IN SITU MEASUREMENT

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

IN VITRO METHODS AND TESTS

An In Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

Generation of in Vitro Cellular Models of Lymphangiomyomatosis for the Development of Tuberous Sclerosis Therapeutics – 174

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

IN VIVO METHODS AND TESTS

Chromosome Aberrations in Astronauts – 203

Integrated Cancer Research in Five Thematic Areas of Interest – 176

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

INDEXES (DOCUMENTATION)

Index of International Publications in Aerospace Medicine – 205

INDIA

Gauging U.S.-Indian Strategic Cooperation – 281

INDUSTRIES

Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report – 267

The National Nanotechnology Initiative. Research and Development Leading to a Revolution in Technology and Industry. Supplement to the President's 2006 Budget – 110

Ultra Reliability Workshop Introduction – 128

INERTIAL NAVIGATION

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12

Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV – 11

Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12

Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation – 12

INFECTIOUS DISEASES

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163

High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 179

INFILTRATION

Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61

IN-FLIGHT MONITORING

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197

INFORMATION ANALYSIS

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

INFORMATION FLOW

Command Authority & Information Flows in Net-Centric Operations – 299

INFORMATION MANAGEMENT

Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F – 293

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230

Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – 306

Net-Centric Pub/Sub Information Management Design for Command and Control – 225

Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296

Sensor Ontology Integration for the Knowledge Management for Distributed-Tracking (KMDT) Program – 296

Testing Agile Information Management Systems with Video Test Client. Case Study - DIMES – 302

The Knowledge Structure of the Commander in Asymmetric Battlefield: The Six Sights and Sensemaking Process – 92

INFORMATION RETRIEVAL

Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks – 307

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

QACTIS Enhancements in TREC QA-2006 – 305

INFORMATION SYSTEMS

Analyzing Decisions and Characterizing Information in C2 Systems – 305

AOC Embedded Performance Measurement and Assessment – 228

Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 9

Health Information Technology: Early Efforts Initiated but Comprehensive Privacy Approach Needed for National Strategy – 307

Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158

Integrating Geospatial Technologies into the Right-of-Way Data-Management Process – 293

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230

LISA-The Library and Information Services in Astronomy Conferences – 315

Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300

Net-Centric Pub/Sub Information Management Design for Command and Control – 225

Optimizing Information Operations for the New Maritime Strategy – 303

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308

INFORMATION THEORY

Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308

Quantification of Subjective Information Assessments in C2 Decision Option Selection – 262

INFORMATION

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

The Role of Meta-Information in C2 Decision-Support Systems – 298

INFRARED ASTRONOMY

Spitzer Pre Launch Mission Operations System - The Road to Launch – 314

INFRARED DETECTORS

Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107

Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

INFRARED LASERS

High Power Mid Wave Infrared Semiconductor Lasers – 125

INFRARED RADIATION

2006 Interferometry Imaging Beauty Contest – 119

High Power Mid Wave Infrared Semiconductor Lasers – 124

NASA's Spitzer Space Telescope's Operational Mission Experience – 314

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279

INFRARED RADIOMETERS

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

INFRARED SPECTRA

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 280

INFRARED SPECTROMETERS

Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106

Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279

INGOTS

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65

INHIBITORS

Anticancer Inhibitors of AR-Mediated Gene Expression – 172

Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor – 46

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 187

INJECTION

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

INJECTORS

CAISSON: Interconnect Network Simulator – 237

Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32

INJURIES

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 195

Overuse Injury Assessment Model – 202

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – 204

INORGANIC PEROXIDES

Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189

INSERTION

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127

INSPECTION

Automated Inspection and Processing System – 211

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130

Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments – 15

INSTALLING

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Dies of Complications After Receiving Severe Electrical Shock Installing a TV Tower – 101

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – 143

Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47

The USAF Installation Control Center (ICC) – 90

INSTRUMENTS

'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – 34

INTEGERS

Integer Programming Decoder for Machine Translation – 261

INTEGRALS

Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

INTEGRATED CIRCUITS

Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56

Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100

INTEGRATORS

Facilitating Informed Decisionmaking: The E-DEL+(trademark) Analytic Technique – 248

INTELLIGENCE

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 79

Hyperspectral Imagery: Warfighting Through a Different Set of Eyes – 280

Intent Driven Adversarial Modeling – 261

Modeling Intelligent C2 Using Technology of Multi-Agent – 83

INTERFACES

Towards a Framework for Modeling Space Systems Architectures – 220

INTERFEROMETERS

2006 Interferometry Imaging Beauty Contest – 119

INTERFEROMETRY

2006 Interferometry Imaging Beauty Contest – 119

Noise Radar Technology Basics – 118

Variable Resolution Direction Finding Using the Robust Symmetrical Number System – 104

INTERMETALLICS

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

INTERNAL COMBUSTION ENGINES

Development of a Cummins Westport SI-EGR Natural Gas Engine at 0.2 g/bhp-hr. February 2, 2005-July 31, 2006 – 126

US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126

INTERNAL PRESSURE

Analytical Ion Thruster Discharge Performance Model – 36

INTERNATIONAL COOPERATION

International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310

International Multidisciplinary Artificial Gravity (IMAG) Project – 199

INTERNATIONAL LAW

NASA's System for Tracking Foreign Contracts and Subcontracts – 24

INTERNATIONAL RELATIONS

Joint Strike Fighter Across the Atlantic: To Unify or Divide – 14

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

INTERNATIONAL SPACE STATION

2nd ISS Treadmill Development 'T2 Project' – 207

Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197

External Cargo Integration Overview – 30

International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 31

Summary of the Science performed onboard the International Space Station during Increments 12 and 13 – 309

The Importance of Multilateral Safety Requirements for Human Spaceflight – 30

- The International Space Station as a Research Laboratory: A View to 2010 and Beyond – 72
- The International Space Station: Stepping-stone to Exploration – 323
- INTERNETS**
- Performance Evaluation of ‘SRFS on Ether’ on the Internet – 77
- Technical and Economic Assessment of Internet Protocol Version 6 (IPv6) – 212
- XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244
- INTEROPERABILITY**
- A Joint Medical Command --- Is It Needed to Enhance Medical Interoperability in the Modern Warfight – 192
- Command Authority & Information Flows in Net-Centric Operations – 299
- Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations – 305
- Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230
- Leveraging C2IEDM for Enhancing Systems Interoperability – 151
- Net-Centric, Enterprise-Wide System-of-Systems Engineering and the Global Information Grid – 260
- Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- INTERPOLATION**
- Light Baryon Spectrum using Improved Interpolating Operators – 270
- INTERPROCESSOR COMMUNICATION**
- Coordinating Initiation and Response in Computer-Mediated Communication – 240
- Technical and Economic Assessment of Internet Protocol Version 6 (IPv6) – 212
- INVARIANCE**
- Intense Neutrino Beams and Leptonic CP Violation – 292
- INVENTIONS**
- Castable and High Modulus Acoustic Dampening Material – 306
- INVERSIONS**
- An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253
- IODINE**
- Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 124
- ION ACCELERATORS**
- Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- ION BEAMS**
- Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final – 288
- ION EMISSION**
- Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 37
- ION ENGINES**
- Analytical Ion Thruster Discharge Performance Model – 36
- Apparatus for Study of Ion-Thruster Propellant Ionization – 35
- Comparison of NASA’s 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36
- Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- ION IMPLANTATION**
- Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – 285
- ION OPTICS**
- Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – 285
- ION PROPULSION**
- Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- ION SOURCES**
- Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final – 288
- IONIC REACTIONS**
- The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- IONIZATION**
- Apparatus for Study of Ion-Thruster Propellant Ionization – 35
- Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59
- The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- IONIZED GASES**
- Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2
- IONIZING RADIATION**
- Space Environment (Natural and Induced) – 328
- IONOSPHERES**
- 3rd IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere System/ Abstract – 150
- European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 132
- IONS**
- Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57
- Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264
- Ion Mobility Spectrometry Method and Apparatus – 266
- Nanodosimeter Based on Single Ion Detection – 265
- QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 268
- Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
- IRAQ**
- Finding the Right Measures of Effectiveness for Rebuilding the State of Iraq – 130
- U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations – 254
- IRON OXIDES**
- Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- IRON**
- Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- IRRADIATION**
- EUV Testing of Multilayer Mirrors: Critical Issues – 275
- ISENTROPIC PROCESSES**
- Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 62
- ISOTOPES**
- Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- JET AIRCRAFT NOISE**
- Progress Toward Improving Jet Noise Predictions in Hot Jets – 278
- JET ENGINE FUELS**
- Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54
- JET FLOW**
- 3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 118

- A Magnetohydrodynamic Boost for Relativistic Jets – [116](#)
- Progress Toward Improving Jet Noise Predictions in Hot Jets – [278](#)
- Structure and Dynamics of GRB Jets – [317](#)
- The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – [117](#)
- JP-8 JET FUEL**
- JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – [173](#)
- KALMAN FILTERS**
- Particle Filtering With Dynamic Shape Priors – [251](#)
- KERNEL FUNCTIONS**
- Comparative Analysis of Kernel Methods for Statistical Shape Learning – [245](#)
- Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – [246](#)
- KEVLAR (TRADEMARK)**
- Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – [49](#)
- KINETIC ENERGY**
- Coupled Groups of g-Modes in a Sun with Mixed Core – [327](#)
- KINETICS**
- Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – [273](#)
- KNEE (ANATOMY)**
- The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – [198](#)
- LABORATORIES**
- National Environmental Laboratory Accreditation Conference. Constitution, By-laws, and Standards Approved July 1998 – [38](#)
- LAKES**
- Interactive Pit Lakes 2004 Conference (on CD-ROM) – [294](#)
- Silica Extraction at the Mammoth Lakes Geothermal Site – [67](#)
- LAMINATES**
- Array of Laminated Waveguides for Implementation in LTCC Technology – [110](#)
- Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids – [116](#)
- Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – [47](#)
- Vapor Depositor of Silicon Dioxide Nanolaminates – [38](#)
- LAND USE**
- A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – [137](#)
- LANDSAT SATELLITES**
- Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – [138](#)
- LANTHANUM**
- Comparison of LaBr3:CE and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – [276](#)
- LAP JOINTS**
- Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – [18](#)
- LAPLACE TRANSFORMATION**
- An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – [253](#)
- LASER APPLICATIONS**
- Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – [320](#)
- Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – [284](#)
- LASER BEAMS**
- Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – [123](#)
- LASER CAVITIES**
- High Power Mid Wave Infrared Semiconductor Lasers – [125](#)
- Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – [122](#)
- LASER FUSION**
- Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – [285](#)
- LASER OUTPUTS**
- T-REX Design Considerations for Detection of Concealed 238U – [268](#)
- LASER PLASMAS**
- Microdischarge Sources of O2(singlet Delta) – [288](#)
- LASER RANGING**
- Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – [31](#)
- LASER SPECTROSCOPY**
- Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – [123](#)
- LASER TARGETS**
- Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – [35](#)
- LLE Review. Quarterly Report. Volume 106 (January-March 2006) – [282](#)
- LLE Review. Quarterly Report. Volume 107 (April-June 2006) – [282](#)
- LLE Review. Quarterly Report. Volume 108 (July-September 2006) – [282](#)
- LASERS**
- Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – [124](#)
- Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – [123](#)
- Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – [285](#)
- Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – [280](#)
- Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – [285](#)
- Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – [284](#)
- Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – [58](#)
- LLE Review. Quarterly Report. Volume 106 (January-March 2006) – [282](#)
- LLE Review. Quarterly Report. Volume 107 (April-June 2006) – [282](#)
- LLE Review. Quarterly Report. Volume 108 (July-September 2006) – [282](#)
- Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – [284](#)
- LASING**
- Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – [68](#)
- LAUNCH VEHICLES**
- Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – [28](#)
- LAUNCHING**
- Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hangups – [130](#)
- Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – [29](#)
- LAW (JURISPRUDENCE)**
- State Department: State Has Initiated a More Systematic Approach for Managing Its Aviation Fleet – [20](#)
- LEAD (METAL)**
- Environmental Technology Verification Report: Field Portable X-ray Fluorescence Analyzer. Niton XL Spectrum Analyzer – [141](#)

LEADERSHIP

Developing Expertise at the Operational-Level of Warfare – 297

Filtering and Trust as Tools for the Operational Commander in the Information Age – 304

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79

Model-Based Organization Analysis and Design for an ESG Organization – 258

What Force and Metrics for What End - Characterizing the Future Leadership and Force – 83

LEAKAGE

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

Low Leakage Finger Seal – 44

Pyrovalve Blowby Tests – 128

LEARNING

PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – 247

LENSES

UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274

LEPTONS

Intense Neutrino Beams and Leptonic CP Violation – 292

LETHALITY

Directed Energy Weapons on the Battlefield: A New Vision for 2025 – 124

Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58

LIBRARIES

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209

LISA-The Library and Information Services in Astronomy Conferences – 315

NOAA's National Climatic Data Center Annual Report, 2005 – 156

LICENSING

National Environmental Laboratory Accreditation Conference. Constitution, By-laws, and Standards Approved July 1998 – 38

LIFE (DURABILITY)

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 65

LIFE SCIENCES

Detecting Life and Biology-Related Parameters on Mars – 196

Space Exploration: Challenges in Medicine, Research, and Ethics – 205

Summary of the Science performed onboard the International Space Station during Increments 12 and 13 – 309

LIFE SUPPORT SYSTEMS

Exploration Life Support: ELS Functions and Materials Interfaces – 207

LIFTING BODIES

Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2

LIGANDS

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

LIGHT EMITTING DIODES

Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 108

LIGHT TRANSMISSION

Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – 68

LIGHTNING

Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154

Lightning Protection System for HE Facilities at LLNL-Certification Template – 154

LINE OF SIGHT

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285

LINEAR ACCELERATORS

Beam Transport Lines for the BSNS – 291

Upgrading the CEBAF Accelerator to 12 GeV – 289

LINEAR ENERGY TRANSFER (LET)

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327

LINEAR PARAMETER-VARYING CONTROL

Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region – 1

LINEAR PROGRAMMING

Integer Programming Decoder for Machine Translation – 261

LINEARITY

Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System – 276

Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326

LINGUISTICS

Comparing Evaluation Metrics for Sentence Boundary Detection – 75

LININGS

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48

Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48

LINKAGES

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168

LIQUEFIED NATURAL GAS

LNG Safety Research: FEM3A Model Development – 146

LIQUID CRYSTALS

Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – 59

Liquid Crystal Polymers as a Machine Fluid (on CD-ROM) – 40

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57

Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55

LIQUID FUELS

Emissions Control in Swirl-Stabilized Combustors – 125

LIQUID METALS

Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir – 277

LIQUID PHASES

Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61

LIQUID PROPELLANT ROCKET ENGINES

CFD Modeling Activities at the NASA Stennis Space Center – 113

LIQUID ROCKET PROPELLANTS

Analysis of the Electro spray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57

LITHIUM NIOBATES

Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55

LITHIUM

81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138

LITHOGRAPHY

EUV Testing of Multilayer Mirrors: Critical Issues – 275

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42

LOADS (FORCES)

An Advanced Tabu Search Approach to the Airlift Loading Problem – 251

Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads – 49

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hang-ups – 129

Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129

LOCAL AREA NETWORKS
Location Based Services for Integrated Cellular and LAN Networks – 214

LOCKING
Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127

LOGISTICS
Air Force Journal of Logistics. Volume 30, Number 3, Fall 2006 – 71
Reconfiguring Logistics Command and Control for the 21st Century – 87

LONG TERM EFFECTS
Assessing the Dangers of Moon Dust – 206
Space Environment (Natural and Induced) – 327

LOW ASPECT RATIO
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115

LOW COST
A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24
Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV – 11
Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55
Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12
Low-cost Large Aperture Telescopes for Optical Communications – 284
Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63

LOW EARTH ORBITS
A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324
Solar Sail Model Validation from Echo Trajectories – 37

LOW SPEED
Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 274

LOW VOLTAGE
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103

LUBRICANTS
Evaluations of QMI After-Market Additives – 7
Method for Testing Properties of Corrosive Lubricants – 41

LUBRICATING OILS
Evaluations of QMI After-Market Additives – 7

LUBRICATION
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 40

LUMINAIRES
The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery – 5

LUNAR DUST
Assessing the Dangers of Moon Dust – 206
Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324

LUNAR ENVIRONMENT
Space Suit Radiator Performance in Lunar and Mars Environments – 324

LUNAR ORBITER
Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149

LUNAR RADIATION
Heliophysics Science Enabled By the Return to the Moon – 325

LUNAR SURFACE
Heliophysics Science Enabled By the Return to the Moon – 325
Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324

LUNGS
Asthma and Physical Activity in the School: Making a Difference – 148

LYMPHATIC SYSTEM
An in Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

LYMPHOCYTES
Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 177

MACHINE LEARNING
From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 254
Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
Tandem Learning: A Learning Framework for Document Categorization – 295

MACHINE TOOLS
A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241

MACHINE TRANSLATION
Integer Programming Decoder for Machine Translation – 261

MAGNESIUM
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43

MAGNETIC FIELDS
National Geomagnetism Program: Current Status and Five-Year Plan, 2006-2010 – 132
Pattern Transfer with Self-Similar Sacrificial Mask Layer and Vector Magnetic Field Sensor – 98

MAGNETIC INDUCTION
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Micro Magnetic Induction Machines for Portable Power Applications – 139

MAGNETIC MATERIALS
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139

MAGNETIC RESONANCE SPECTROSCOPY
Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165

MAGNETIC RESONANCE
Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280
Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165
Phantom for Production of Controllable fMRI Signal – 97
Tissue Tracking: Applications for Brain MRI Classification – 281
Undergraduate Summer Training Program in Breast Cancer Imaging – 171

MAGNETIC STORAGE
Bias-Adjusted Magnetoresistive Devices for Magnetic Random Access Memory (MRAM) Applications – 94
Pseudo Tunnel Junction – 265

MAGNETIC STORMS
Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 133

MAGNETIZATION
Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115

MAGNETOHYDRODYNAMIC WAVES
3D Relativistic Magneto-hydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 118

MAGNETOHYDRODYNAMICS

A Magneto hydrodynamic Boost for Relativistic Jets – 117

Applying MHD Results to a Scramjet Vehicle – 287

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

MAGNETOMETERS

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 120

MAGNETORESISTIVITY

Bias-Adjusted Magneto resistive Devices for Magnetic Random Access Memory (MRAM) Applications – 94

Separate Write and Read Access Architecture for a Magnetic Tunnel Junction – 94

Tunneling Anisotropic Magneto resistive Device and Method of Operation – 94

MAGNETORHEOLOGICAL FLUIDS

Nanostructured Magneto rheological Fluids and Gels – 39

MAINTAINABILITY

– 83

MAINTENANCE

Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3

Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments – 15

MALES

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

MAMMARY GLANDS

A Comprehensive Postdoctoral Training Program in Breast Cancer – 190

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187

An in Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 193

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 67

Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177

Bioavailability of TGF-Beta in Breast Cancer – 192

Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – 186

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185

Development of a Computational Assay for the Estrogen Receptor – 179

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178

Endocrine Therapy of Breast Cancer – 183

ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182

Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194

Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161

Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation – 178

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181

Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – 179

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193

The Role of Capase-8 in Breast Carcinoma Cells – 189

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

Undergraduate Summer Training Program in Breast Cancer Imaging – 171

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

Vectors for Treatment of Metastatic Breast Cancer – 184

MAN MACHINE SYSTEMS

A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209

MANAGEMENT METHODS

Command World – 80

Information Fusion for Natural and Man-Made Disasters – 304

Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157

MANAGEMENT PLANNING

A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241

Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report – 121

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

MANAGEMENT SYSTEMS

Environmental Information Management and Decision Support System Implementation Handbook. Appendixes B through F – 293

Testing Agile Information Management Systems with Video Test Client. Case Study - DIMES – 302

MANEUVERABILITY

Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 15

MANEUVERS

Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232

MANNED SPACE FLIGHT

Nutritional Status Assessment (SMO 016E) – 203

- The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321
- MANUAL CONTROL**
Two-Speed Manual Wheelchair Wheel – 210
- MANUFACTURING**
Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43
Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60
- MAPPING**
Mapping the Future: Optimizing Joint Geospatial Engineering Support – 136
- MARINE ENVIRONMENTS**
A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119
- MARINE METEOROLOGY**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 134
- MARINE TECHNOLOGY**
Acoustic Design of Naval Structures – 279
- MARKERS**
Identification of Splice Variants as Molecular Markers in Parkinson's Disease – 185
Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165
- MARKING**
Coarse Coding for Material and Object Identification – 246
- MARS ENVIRONMENT**
Space Suit Radiator Performance in Lunar and Mars Environments – 324
- MARS EXPLORATION**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 323
From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311
- MARS MISSIONS**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 313
- MARS (PLANET)**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 323
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- MARS RECONNAISSANCE ORBITER**
Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELs) – 219
- MARS SURFACE SAMPLES**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 323
- MARS SURFACE**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 323
Detecting Life and Biology-Related Parameters on Mars – 196
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- MASKS**
Pattern Transfer with Self-Similar Sacrificial Mask Layer and Vector Magnetic Field Sensor – 98
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- MASS SPECTROSCOPY**
Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57
Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59
- MASS TRANSFER**
Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145
- MATERIALS SELECTION**
Exploration Life Support: ELS Functions and Materials Interfaces – 207
- MATHEMATICAL MODELS**
A Parallel Saturation Algorithm on Shared Memory Architectures – 236
A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System – 292
A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- CFD Modeling Activities at the NASA Stennis Space Center – 113
Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252
Control Reconfiguration of Command and Control Systems – 92
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134
Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274
Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275
Intent Driven Adversarial Modeling – 261
Microdischarge Sources of O₂(singlet Delta) – 288
Numerical Solution of the Extended Non-linear Schrodinger Equation – 286
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
The SWANSURF Wave Model Implementation and User Manual – 221
Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260
- MATRIX MATERIALS**
Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49
Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- MEASURE AND INTEGRATION**
Plasticity Integration Algorithm Motivated by Analytical Integration of a Generalized Quadratic Function – 67
- MEASUREMENT**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- MEASURING INSTRUMENTS**
Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127
- MECHANICAL DEVICES**
Elongated Nano-Structures and Related Devices – 38
Emissive Sensors and Devices Incorporating These Sensors – 96
Hole Transport Layer Compositions and Related Diode Devices – 95

- Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- Tunneling Anisotropic Magneto-resistive Device and Method of Operation – 94
- MECHANICAL PROPERTIES**
- Aging Properties of An HTPB Propellant – 261
- Fusing Competing Prediction Algorithms for Prognostics (Preprint) – 250
- Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43
- Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr) – 66
- MECHANICS (PHYSICS)**
- An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290
- MEDICAL SCIENCE**
- Development of the Meharry Medical College Prostate Cancer Research Program – 191
- Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Integrated Cancer Research in Five Thematic Areas of Interest – 176
- MEDICAL SERVICES**
- A Joint Medical Command --- Is It Needed to Enhance Medical Interoperability in the Modern Warfight – 192
- Immune Cells, if Rendered Insensitive to Transforming Growth Factorbeta, Can Cure Prostate Cancer – 195
- MELTING POINTS**
- Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- MELTING**
- High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69
- MEMBRANES**
- Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66
- Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- MEMORY (COMPUTERS)**
- A Parallel Saturation Algorithm on Shared Memory Architectures – 236
- MENSTRUATION**
- Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Pre-menopausal Women – 189
- MENTAL PERFORMANCE**
- An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – 206
- Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104
- Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
- Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81
- Operator Site 2004-2005 (Operatoers-platsen 2004-2005) – 19
- MERCURY FLIGHTS**
- The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321
- MESONS**
- Exotic and Higher Spin Mesons in Charmonium – 271
- Observation of a Broad Structure at an Invariant Mass of 4.32 GeV in the Reaction e+e- to pi+pi-psi(2S) Measured at BaBar – 275
- MESOSCALE PHENOMENA**
- Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65
- MESOSPHERE**
- Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 133
- MESSAGE PROCESSING**
- UMass at TREC 2006: Enterprise Track – 87
- MESSAGES**
- Short Message Service (SMS) Security Solution for Mobile Devices – 228
- METABOLISM**
- Detecting Life and Biology-Related Parameters on Mars – 196
- Nutritional Status Assessment (SMO 016E) – 203
- Overuse Injury Assessment Model – 202
- METAL DRAWING**
- Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- METAL FATIGUE**
- Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 65
- METAL FOILS**
- Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- METAL IONS**
- Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56
- METAL MATRIX COMPOSITES**
- Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- METAL OXIDES**
- Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62
- METAL PLATES**
- Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64
- METAL POWDER**
- Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62
- Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- METAL PROPELLANTS**
- Bismuth Propellant Feed System Development at NASA-MSFC – 71
- METALLIZING**
- Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 131
- METALS**
- Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64
- System and Method of Use for Electrochemical Measurement of Corrosion – 65
- METASTASIS**
- A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187
- An In Vitro Study of Breast Cancer Invasion into the Lymphatics – 177
- ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182

- Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167
- Vectors for Treatment of Metastatic Breast Cancer – 184
- METEORITIC COMPOSITION**
- A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150
- The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- METEOROLOGY**
- Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- METHODOLOGY**
- Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 109
- Method and System for Extensible Position Location – 214
- Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107
- Methods for Wireless Mesh Multicasting – 214
- Sidewall-Functionalized Carbon Nanotubes and Methods for making the Same – 66
- Solid State High Power Device and Method – 96
- Waveguide Apparatus and Method – 93
- METHYLATION**
- DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 181
- MICE**
- A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190
- Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194
- MPD in Telomerase Null Mice – 165
- Preclinical Mouse Models of Neurofibromatosis – 191
- MICROBIOLOGY**
- Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 313
- MICROCHANNELS**
- Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids – 116
- MICROELECTROMECHANICAL SYSTEMS**
- Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95
- Microscopic Batteries for MEMS Systems – 97
- Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105
- MICROELECTRONICS**
- The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33
- MICROGRAVITY**
- Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201
- Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Effects of Finite Sample Width on Transition and Flame Spread in Microgravity – 70
- Microgravity Effects on Combustion of Polymers – 69
- Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73
- MICROINSTRUMENTATION**
- Double Hidden Flexure Microactuator for Phase Mirror Array – 98
- MICROMACHINING**
- Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
- MICROMECHANICS**
- Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95
- MICROMINIATURIZATION**
- Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3
- Pesky Critters – 9
- Small Power: The Role of Micro and Small UAVs in the Future – 10
- MICROORGANISMS**
- Detecting Life and Biology-Related Parameters on Mars – 196
- Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- MICROPARTICLES**
- Optical Characterization of Micro Particles in Molecular Plasmas – 56
- MICROSATELLITES**
- Space-Based Observations of Satellites From the MOST Microsatellite – 25
- MICROSCOPY**
- Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
- Orientation Independent Differential Interference Contrast Microscopy Technique and Device – 283
- MICROSTRUCTURE**
- A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200
- Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64
- MICROWAVE CIRCUITS**
- Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111
- MICROWAVE EQUIPMENT**
- Gruppennteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- MICROWAVES**
- A Microwave-Augmented Plasma Torch Module – 287
- Congressional-Microwave Vacuum Electronics Power Res. Ini.) TWT Coatings Improvement Investigation – 106
- Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111
- Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273
- Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- MIDDLE ATMOSPHERE**
- Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 133
- MIGRATION**
- Role of Delocalized Charges in the Pyroelectric Effect – 273
- MILITARY HELICOPTERS**
- Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 14
- MILITARY OPERATIONS**
- A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
- A Joint Medical Command --- Is It Needed to Enhance Medical Interoperability in the Modern Warfight – 192
- A System Shock Approach to Modelling Clandestine Network Disruption – 78

Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward – 84

An Operational Commander's Guide to the Media – 91

Battle of the Bulge: The Impact of Information Age Command and Control on Conflict – 82

C2 in the Joint Task Force (JTF) Enterprise – 91

Cognitive Constructs and the Sensemaking Process – 86

Development of a Passively Deployed Roll-Out Solar Array – 9

Effective USAF Air Traffic Control to Support Proposed Phase IV Operations – 13

Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations – 305

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice – 247

Identifying Potential Implications of Technologies on Military and Security Operations – 261

Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260

Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308

Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257

Joint Helicopter Command: The 'Purple' Evolution of Rotary-Wing Aviation – 19

Joint Strike Fighter Across the Atlantic: To Unify or Divide – 14

Keeping an Operational Perspective in a Network-Centric World – 93

Military Role in Space Control: A Primer – 24

Military-Media Relations: Lessons for the Joint Force Commander – 91

Model-Based Organization Analysis and Design for an ESG Organization – 258

Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296

Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238

Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle – 90

Operational Art for Space Control: Do the Principles of War Apply – 28

Operational Command and Control for Information Operations – 303

Operationalizing Defense Support to Public Diplomacy – 93

Operator Site 2004-2005 (Operators-platsen 2004-2005) – 19

Owning the Weather in the Maritime Environment – 157

Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259

Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39

Scenario Generation to Support Mission Planning – 226

Sensor Ontology Integration for the Knowledge Management for Distributed-Tracking (KMDT) Program – 296

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs – 92

Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace – 80

The Civil Reserve Air Fleet: A Vulnerable National Asset – 16

The Way Ahead For Maritime UAVS – 19

MILITARY PERSONNEL

Africa Command: An Interagency Solution and SOF's Role – 139

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 78

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174

Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace – 80

U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations – 254

MILITARY PSYCHOLOGY

Psychological Operations: The Theory of Behavioral Influence – 205

MILITARY TECHNOLOGY

Developing a Viable Approach for Effective Tiered Systems – 262

Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273

Hyperspectral Imagery: Warfighting Through a Different Set of Eyes – 280

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230

Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120

Small Power: The Role of Micro and Small UAVs in the Future – 10

MILLIMETER WAVES

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130

Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111

MINE DETECTORS

Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123

MINERALOGY

A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151

Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322

Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149

Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132

SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321

MINERALS

Fibrous Minerals Methods for Their Production Using a Solution-Precursor-Solid Mechanism and Methods and Use – 47

MINIATURIZATION

Detecting Life and Biology-Related Parameters on Mars – 196

MINING

Interactive Pit Lakes 2004 Conference (on CD-ROM) – 294

MIR SPACE STATION

Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324

MIRRORS

Double Hidden Flexure Microactuator for Phase Mirror Array – 98

EUV Testing of Multilayer Mirrors: Critical Issues – 274

Low-cost Large Aperture Telescopes for Optical Communications – 284

MISSILE DEFENSE

Centralized Command and Control of Theater Missile Defense: The Joint Force Missile Defense Component Coordinator – 86

Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79

MISSILES

Centralized Command and Control of Theater Missile Defense: The Joint Force Missile Defense Component Coordinator – 86

MISSION PLANNING

Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36

Model-Based Organization Analysis and Design for an ESG Organization – 258

Scenario Generation to Support Mission Planning – 226

Standardizing an End-to-end Accounting Service – 72

The Cassini-Huygens Mission Overview – 311

The Importance of Multilateral Safety Requirements for Human Spaceflight – 30

MITOSIS

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

MIXERS

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Electrocuted While Attempting to Change a Fuse in a Fuse Box Providing Power to a Fertilizer Mixer/Loader – 101

MOBILE COMMUNICATION SYSTEMS

A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 225

MOBILITY

Ion Mobility Spectrometry Method and Apparatus – 266

Soldier Performance Issues in C2 'On the Move' – 88

MODELS

Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259

Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252

Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181

Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262

From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 253

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 114

LNG Safety Research: FEM3A Model Development – 146

Modeling Intelligent C2 Using Technology of Multi-Agent – 83

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

Radio Path Prediction Software for Command and Control Scenario Developers – 259

XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223

MODIS (RADIOMETRY)

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 309

MODULARITY

Sustainable, Reliable Mission-Systems Architecture – 242

MODULATION

Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 184

Identification Coding Schemes for Modulated Reflectance Systems – 97

MODULATORS

Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

MODULES

Hybrid-Phased Communication Array – 107

MOISTURE CONTENT

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74

MOLECULAR BEAM EPITAXY

Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106

MOLECULAR DYNAMICS

Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106

Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics – 125

MOLECULAR INTERACTIONS

The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280

MOLECULES

Optical Characterization of Micro Particles in Molecular Plasmas – 56

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

MOMENTUM

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 32

MONKEYS

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendmiddelen in marmosetapen) – 201

Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

MONOPROPELLANTS

High Energy Density Material Chemistry – 57

MONTE CARLO METHOD

Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291

Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report – 102

MORNING

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

MORPHOLOGY

Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322

MORTALITY

Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160

Respiratory Disease in Agricultural Workers: Mortality and Morbidity Statistics – 147

MOTION

Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112

Motion from Fixation – 263

Soldier Performance Issues in C2 'On the Move' – 88

MOVING TARGET INDICATORS

CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 122

MULTIDISCIPLINARY RESEARCH

Multidisciplinary Computational Research – 252

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

The International Space Station as a Research Laboratory: A View to 2010 and Beyond – 72

MULTIMEDIA

AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 224

MULTIPLE ACCESS

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87

MULTIPROGRAMMING

Generating Epsilon-Efficient Solutions in Multiobjective Programming – 250

MULTISCALE MODELS

Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148

MULTISENSOR FUSION

Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 10

Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective – 264

Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304

Information Fusion for Natural and Man-Made Disasters – 304

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

MUSCULOSKELETAL SYSTEM

Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61

The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198

MUTATIONS

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167

NANOCOMPOSITES

Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99

NANOCRYSTALS

Boron-Doped Nanocrystalline Diamond – 97

Shaped Nanocrystal Particles and Methods for Working the Same – 39

NANOFABRICATION

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42

Nanostructured Magnetorheological Fluids and Gels – 39

NANOPARTICLES

Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195

Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr) – 66

NANOSTRUCTURE (CHARACTERISTICS)

Elongated Nano-Structures and Related Devices – 38

Nanomaterials Work at NASA-Johnson Space Center – 289

Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99

NANOSTRUCTURE GROWTH

Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – 265

Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73

Nanomaterials Work at NASA-Johnson Space Center – 289

NANOSTRUCTURES (DEVICES)

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42

Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99

Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells – 104

Phonon Enhancement of Electronic and Optoelectronic Devices – 105

NANOTECHNOLOGY

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42

Nanodosimeter Based on Single Ion Detection – 265

Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195

Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons – 17

The National Nanotechnology Initiative. Research and Development Leading to a Revolution in Technology and Industry. Supplement to the President's 2006 Budget – 110

Vapor Deposition of Silicon Dioxide Nanolaminates – 38

NANOWIRES

Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43

NARROWBAND

Joint Demodulation of Low-Entropy Narrowband Cochannel Signals – 119

NASA PROGRAMS

CFD Modeling Activities at the NASA Stennis Space Center – 113

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133

GPS – 134

Implementation of Programmatic Quality and the Impact on Safety – 128

Improvements to NASA's Debris Assessment Software – 215

International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310

Nanomaterials Work at NASA-Johnson Space Center – 289

NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288

NASA's Software Safety Standard – 231

NASA's System for Tracking Foreign Contracts and Subcontracts – 23

The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33

Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool – 11

NASA SPACE PROGRAMS

Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324

Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System – 14

Human Research Program: Space Human Factors and Habitability Element – 210

The International Space Station as a Research Laboratory: A View to 2010 and Beyond – 72

The International Space Station: Stepping-stone to Exploration – 323

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321

Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20

NATIONAL AIRSPACE SYSTEM

A Robust Scalable Transportation System Concept – 237

NATURAL GAS

Development of a Cummins Westport SI-EGR Natural Gas Engine at 0.2 g/bhp-hr. February 2, 2005-July 31, 2006 – 126

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145

US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126

NATURAL LANGUAGE PROCESSING

Comparing Evaluation Metrics for Sentence Boundary Detection – 75

NAVIGATION INSTRUMENTS

Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 35

NAVIGATION

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 31

Solar Sail Model Validation from Echo Trajectories – 37

Workload and Stress of Crews Operating Future Manned Vehicles – 229

NAVY

FORCenet Net Centric Architecture - A Standards View – 239

Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations – 305

Optimizing Information Operations for the New Maritime Strategy – 303

NEEDLES

Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57

NERVES

Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59

NETWORK ANALYSIS

Agile Assessment Techniques for Evaluating Mission Capability Portfolio Ensembles in Complex Adaptive Architectures – 235

The Emerging Importance of Business Process Standards in the Federal Government – 226

NETWORK CONTROL

A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225

NETWORKS

A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119

Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224

AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223

Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software – 164

Network-Enabled Precision Guided Munitions – 243

Workshop: Theory and Applications of Coupled Cell Networks – 256

NEURAL NETS

Fast Prediction of HCCI Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127

Human Interface to Netcentricity – 308

NEUROLOGY

A Morpholino Strategy to Assess TSC Gene Function in Zebrafish – 164

NEUTRINO BEAMS

Intense Neutrino Beams and Leptonic CP Violation – 292

NEUTRON COUNTERS

Directional Detection of a Neutron Source – 277

NEUTRON SOURCES

Directional Detection of a Neutron Source – 277

NEUTRONS

Directional Detection of a Neutron Source – 277

NEWS MEDIA

An Operational Commander's Guide to the Media – 91

Military-Media Relations: Lessons for the Joint Force Commander – 91

NICKEL ALLOYS

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

NIGHT SKY

Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 151

NIGHT

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

NITRATES

Analysis of Particulate Nitrate and Black Carbon Time Series – 142

Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52

NITRIC OXIDE

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

NITROGEN OXIDES

Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – 144

NITROGEN

High Energy Density Material Chemistry – 57

NODES (STANDING WAVES)

Method and System for Extensible Position Location – 214

NOISE MEASUREMENT

Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 35

NOISE PREDICTION

Progress Toward Improving Jet Noise Predictions in Hot Jets – 278

NOISE REDUCTION

Acoustic Design of Naval Structures – 279

NONDESTRUCTIVE TESTS

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130

Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67

NONLINEAR EQUATIONS

Numerical Solution of the Extended Non-linear Schrodinger Equation – 286

NONLINEAR OPTICS

Numerical Solution of the Extended Non-linear Schrodinger Equation – 286

NONLINEAR SYSTEMS

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105

Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region – 1

Unsteady Motions in Combustion Chambers for Propulsion Systems – 113

NONLINEARITY

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105

NORMALITY

An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290

NOZZLE DESIGN

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

NUCLEAR MAGNETIC RESONANCE

Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280

NUCLEAR MEDICINE

Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event – 159

NUCLEAR RADIATION

Nuclear Forensic Field Exercise 1 – 282

NUCLEATION

A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200

NUCLEI (NUCLEAR PHYSICS)

From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275

NUCLEON-NUCLEON INTERACTIONS

From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275

NUCLEONS

Calculation of the nucleon axial charge in lattice QCD – 270

Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 271

Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270

Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS – 272

NUCLEOTIDES

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

NUMERICAL ANALYSIS

A Unified Analytical Look at Reynolds Flocking Rules – 249

Constraints on the Grueneisen Theory – 252

Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 126

Experimental Investigation and Numerical Prediction of a Cross-Flow Fan – 112

Generating Epsilon-Efficient Solutions in Multiobjective Programming – 250

High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263

Multidisciplinary Computational Research – 251

NUTRITIONAL REQUIREMENTS

Nutritional Status Assessment (SMO 016E) – 203

OBJECT-ORIENTED PROGRAMMING

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

OBSERVATORIES

Spitzer Pre Launch Mission Operations System - The Road to Launch – 314

Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60

OBSTACLE AVOIDANCE

Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 15

OCEAN BOTTOM

Extraction and Rendering Techniques for Digital Charting Databases – 136

OCEAN SURFACE

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

OCEANOGRAPHY

Serving Fisheries and Ocean Metadata to Communities Around the World – 294

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

OCEANS

A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119

Ocean Mixed Layer Response to Gap Wind Scenarios – 156

OIL ADDITIVES

Evaluations of QMI After-Market Additives – 7

OIL EXPLORATION

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

OILS

A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272

Air Force Journal of Logistics. Volume 30, Number 3, Fall 2006 – 71

Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 39

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil – 70

War without Oil: A Catalyst for True Transformation – 136

OLIGONUCLEOTIDES

A Morpholino Strategy to Assess TSC Gene Function in Zebrafish – 164

OLIVINE

Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 152

ON-LINE SYSTEMS

Serving Fisheries and Ocean Metadata to Communities Around the World – 294

OPEN SOURCE LICENSING (COMPUTERS)

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) – 221

OPERATING SYSTEMS (COMPUTERS)

Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 217

Wide-Area Computing: Resource Sharing on a Large Scale – 235

OPERATIONAL PROBLEMS

A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241

OPERATIONS RESEARCH

Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260

OPERATORS (MATHEMATICS)

From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275

OPTICAL COMMUNICATION

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 103

Low-cost Large Aperture Telescopes for Optical Communications – 284

Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

OPTICAL COUNTERMEASURES

Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120

OPTICAL COUPLING

R.F Microphotonics for NASA Space Communications Applications – 31

OPTICAL EQUIPMENT

Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 102

OPTICAL MATERIALS

Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors – 318

OPTICAL MEASUREMENT

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12

OPTICAL MEASURING INSTRUMENTS

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12

Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation – 12

OPTICAL PROPERTIES

Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors – 318

Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12

Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells – 104

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36

Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation – 12

OPTICAL PUMPING

High Power Mid Wave Infrared Semiconductor Lasers – 125

OPTICAL RADAR

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134

OPTICAL RESONATORS

Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123

OPTICAL TRACKING

Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248

OPTICAL WAVEGUIDES

Apparatus and Method for Coupling Light to a Thin Film Optical Waveguide – 99

OPTIMAL CONTROL

Accelerating the Discovery of Effective Photonic Reagents – 45

OPTIMIZATION

An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 302

Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – 28

Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 113

Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43

Optimizing Information Operations for the New Maritime Strategy – 303

Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 14

The Vision Problem: Exploiting Parallel Computation – 245

OPTOELECTRONIC DEVICES

Phonon Enhancement of Electronic and Optoelectronic Devices – 106

ORBIT DETERMINATION

Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – 31

ORDNANCE

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 120

Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120

ORGANIC COMPOUNDS

No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 60

Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317

ORGANIC MATERIALS

Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42

International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006 – 42

Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317

ORGANIZATIONS

A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252

An Agent-Based Simulation Model for Organizational Analysis – 86

Assessing Self Organization and Emergence in C2 Processes – 307

Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252

Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299

Experiments into the Operation and Effectiveness of Edge Organizations – 90

Human Interface to Netcentricity – 308

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79

Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308

Maintaining Situational Awareness in Large, Complex Organizations – 297

Metrics for Uncertainty in Organizational Decision-Making – 247

Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – 306

PERSUADE: Modeling Framework for the Design of Modular Army Organizations – 224

Ultra Reliability Workshop Introduction – 128

OSCILLATIONS

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105

OSCILLATORS

Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106

Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122

OVARIES

Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – 167

Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166

Proteomic Analysis of Cisplatin-Resistant Ovarian Cancers – 173

OXIDATION

Genes Involved in Oxidation and Prostate Cancer Progression – 186

Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53

OXIDES

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56

OXYGEN CONSUMPTION

Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201

OXYGEN

Method of Making an Ion Transport Membrane Oxygen Separation Device – 60

Microdischarge Sources of O₂(singlet Delta) – 288

The Orbiting Carbon Observatory: Mission Overview – 311

OZONE

Changing Face of Ozone Management. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

PAINTS

Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18

PALLADIUM ALLOYS

Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66

PANELS

Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49

Development of a Passively Deployed Roll-Out Solar Array – 9

PARAFOILS

Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System – 14

PARALLEL PROCESSING (COMPUTERS)

A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253

A Parallel Saturation Algorithm on Shared Memory Architectures – 236

PARAMETER IDENTIFICATION

Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 109

PARSING ALGORITHMS

Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – 214

PARTICLE ACCELERATORS

Upgrading the CEBAF Accelerator to 12 GeV – 290

PARTICLE ENERGY

Analytical Ion Thruster Discharge Performance Model – 36

PARTICLE IMAGE VELOCIMETRY

Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 274

PARTICLE PRODUCTION

Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS – 272

PARTICLE SPIN

Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313

PARTICLE THEORY

Shaped Nanocrystal Particles and Methods for Working the Same – 39

Smoothed Particle Hydrodynamics: Applications Within DSTO – 116

PARTICLES

Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317

PARTICULATES

An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris – 30

Analysis of Particulate Nitrate and Black Carbon Time Series – 142

Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 39

PASSENGERS

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18

PATENT APPLICATIONS

Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283

Castable and High Modulus Acoustic Dampening Material – 306

Compositions and Methods for Less Immunogenic Protein Formulations – 46

Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids – 116

Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62

Electrochromic Salts Solutions and Devices – 51

Extraction and Rendering Techniques for Digital Charting Databases – 136

Fibrous Minerals Methods for Their Production Using a Solution-Precursor-Solid Mechanism and Methods and Use – 47

High Throughput Screening of Crystallization of Materials – 44

Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99

Location Based Services for Integrated Cellular and LAN Networks – 214

Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir – 277

Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95

Method for Real Time Matched Field Processing – 254

Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor – 46

Methods for Wireless Mesh Multicasting – 214

Orientation Independent Differential Interference Contrast Microscopy Technique and Device – 283

Protein Microarray System – 46

Silver Crystals Through Tollen's Reaction – 44

Trihydroxy Polyunsaturated Eicosanoid Derivatives – 46

Turbine Engine disk Spacers – 21

Turbine Engine Rotor Retainer – 11

PATHOGENESIS

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

PATIENTS

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

- Health-Related Quality of Life for Pediatric NF1 Patients – 171
- Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166
- PATTERN RECOGNITION**
- From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 254
- Statistical Density Modification Using Local Pattern Matching – 215
- PATTERNS**
- Method and System for Transferring a Patterned Material – 109
- PAVEMENTS**
- Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 23
- PAYLOAD INTEGRATION PLAN**
- External Cargo Integration Overview – 30
- PAYLOADS**
- International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- PEPTIDES**
- Identification of Breast Cancer Specific Proteolytic Activities for Targeted Prodrug Activation – 179
- Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195
- PERFORMANCE PREDICTION**
- An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – 206
- Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54
- Modeling Performance in C4ISR Sustained Operations: A Mult-level Approach – 196
- Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queuing Theory. Part II – 7
- PERFORMANCE TESTS**
- Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- Service Assessment: Hurricane Katrina, August 23-31, 2005 – 155
- PERMANENT MAGNETS**
- Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – 139
- PERMEABILITY**
- Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- PERSONNEL DEVELOPMENT**
- A Comprehensive Postdoctoral Training Program in Breast Cancer – 190
- PERSONNEL**
- Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79
- Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – 244
- Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120
- Respiratory Disease in Agricultural Workers: Mortality and Morbidity Statistics – 147
- PETROLEUM PRODUCTS**
- War without Oil: A Catalyst for True Transformation – 136
- PHARMACOLOGY**
- Anticancer Inhibitors of AR-Mediated Gene Expression – 172
- Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169
- Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendemiddelen in marmosetapen) – 201
- Sleep and Alertness Management – 200
- PHASE MODULATION**
- Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
- PHASE SHIFT CIRCUITS**
- Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- PHASE SHIFT**
- Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- PHASED ARRAYS**
- Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- Hybrid-Phased Communication Array – 107
- Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- PHENOLS**
- Cellular Targets of Dietary Polyphenol Resveratrol – 54
- PHENOMENOLOGY**
- Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260
- PHONONS**
- Phonon Enhancement of Electronic and Optoelectronic Devices – 106
- PHOSPHINES**
- Chemoselective Ligation – 52
- PHOSPHORYLATION**
- Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181
- PHOTOGRAPHS**
- Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- PHOTOIONIZATION**
- The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- PHOTOLUMINESCENCE**
- High Power Mid Wave Infrared Semiconductor Lasers – 125
- PHOTONEUTRONS**
- Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- PHOTONICS**
- Accelerating the Discovery of Effective Photonic Reagents – 45
- R.F Microphotonics for NASA Space Communications Applications – 31
- PHOTONS**
- T-REX Design Considerations for Detection of Concealed 238U – 268
- PHOTOPRODUCTION**
- Precision Measurement of the Charged Pion Form and Factor – 276
- PHOTORECEPTORS**
- Purification and Characterization of the Danaus Plexippus Cryptochromes – 173
- PHOTOVOLTAIC CELLS**
- Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140
- PHOTOVOLTAIC EFFECT**
- Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
- Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- PHYSICAL EXERCISE**
- Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300

Nuclear Forensic Field Exercise 1 – 281

Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 197

PHYSICIANS

A Comprehensive Postdoctoral Training Program in Breast Cancer – 190

PHYSIOLOGICAL RESPONSES

Enhancing the Immune Response to Recombinant Plague Antigens – 195

PHYSIOLOGY

Chemoselective Ligation – 52

PIEZOELECTRICITY

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105

PILOTLESS AIRCRAFT

How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security? – 17

NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134

Small Power: The Role of Micro and Small UAVs in the Future – 10

Unmanned Aircraft Pilot Medical Certification Requirements – 205

PILOTS

Age 60 Aviation Rulemaking Committee: Report to the Federal Aviation Administration, November 29, 2006 – 5

Who Pushes the Pickle Button – 8

PINS

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176

Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127

PIONS

Precision Measurement of the Charged Pion Form and Factor – 276

Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS – 272

PIPELINES

Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 64

PIXELS

Coarse Coding for Material and Object Identification – 246

PLANETARY EVOLUTION

The Birth of Planetary Systems – 309

PLANETARY GEOLOGY

Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 150

PLANETARY MASS

Interiors of Enceladus and Rhea – 314

PLANETS

Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – 315

PLANNING

A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225

A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241

Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report – 121

Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice – 247

Identifying Potential Implications of Technologies on Military and Security Options – 261

Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260

Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257

Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle – 90

Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259

Scenario Generation to Support Mission Planning – 226

The Civil Reserve Air Fleet: A Vulnerable National Asset – 16

Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299

PLASMA ELECTRODES

Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 288

PLASMA HEATING

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312

PLASMA JETS

NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 289

Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287

PLASMA RADIATION

Analytical Ion Thruster Discharge Performance Model – 36

Heliophysics Science Enabled By the Return to the Moon – 325

PLASMA TORCHES

A Microwave-Augmented Plasma Torch Module – 287

PLASMAS (PHYSICS)

A Microwave-Augmented Plasma Torch Module – 287

Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115

Heliophysics Science Enabled By the Return to the Moon – 325

High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69

Optical Characterization of Micro Particles in Molecular Plasmas – 56

Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41

UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274

PLASTIC FLOW

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

Plasticity Integration Algorithm Motivated by Analytical Integration of a Generalized Quadratic Function – 67

PLASTIC PROPERTIES

Formulation of a Crystal Plasticity Model – 63

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

Plasticity Integration Algorithm Motivated by Analytical Integration of a Generalized Quadratic Function – 67

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

PLASTICS

Durable Wood Composites for Naval Low-Rise Buildings – 49

PLUGS

Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304

PLUMES

Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57

Develop Documentation/Prepare Remedial Action Concept Plan for Building 24 Contamination Plume at Picatinny Arsenal Appendices – 222

POLAR REGIONS

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149

POLARIMETRY

Classification of Targets Using Optimized ISAR Euler Imagery – 74

CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121

Exploitation of ISAR Imagery in Euler Parameter Space – 74

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73

POLARIZATION

Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107

Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 53

POLICIES

C2 Policy Panel: Under the Avalanche, Which Way Is Up? – 85

C2 Policy: What's it for? – 85

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296

Military Role in Space Control: A Primer – 24

NASA's System for Tracking Foreign Contracts and Subcontracts – 23

National Aeronautics Research and Development Policy – 4

The National Biometrics Challenge – 210

POLLUTION CONTROL

Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51

Changing Face of Ozone Management. ('On the Air' Technical Notes on Important Air Quality Issues) – 142

Estimating Emissions Associated with Portable Fuel Containers (PFCs) – 140

Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 144

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – 144

Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee – 143

Final Supplemental Environmental Assessment: Operational Improvements to Optimize Selective Catalytic Reduction Systems for Nitrogen Oxide Control at Allen Fossil Plant, Units 1, 2, and 3, Shelby County, Tennessee – 144

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4 – 142

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995 – 51

POLLUTION TRANSPORT

Technical Support Document for the Proposed Locomotive/Marine Rule: Air Quality Modeling – 148

POLYCYTHEMIA

DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 181

POLYIMIDE RESINS

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

POLYMER CHEMISTRY

Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55

POLYMER MATRIX COMPOSITES

Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49

POLYMERIZATION

Enzymatic Template Polymerization – 40

POLYMERS

Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – 68

Microgravity Effects on Combustion of Polymers – 69

Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260

POLYMORPHISM

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

POLYTROPIC PROCESSES

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312

POLYURETHANE FOAM

Comprehensive Shuttle Foam Debris Reduction Strategies – 50

PORTABLE EQUIPMENT

Architectural Vulnerabilities of Third-Generation Portable Devices – 242

POSITION (LOCATION)

Location Based Services for Integrated Cellular and LAN Networks – 214

Method and System for Extensible Position Location – 214

Method for Real Time Matched Field Processing – 254

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 77

POSITION SENSING

Method for Real Time Matched Field Processing – 254

POSITIVE FEEDBACK

Constitutive Activation of NF-kappaB in Prostate Carcinoma Cells Through a Positive Feedback Loop: Implication of Inducible IKK-Related Kinase (IKKi) – 164

POSTURE

Dynamic Defensive Posture for Computer Network Defence – 234

POTABLE WATER

Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58

Interactive Workshop on Arsenic Removal from Drinking Water (on CD-ROM) – 52

POWER FACTOR CONTROLLERS

Control of Dual-Opposed Stirling Convertors with Active Power Factor Correction Controllers – 101

POWER GAIN

Congressional-Microwave Vacuum Electronics Power Res. Ini.) TWT Coatings Improvement Investigation – 107

PRECIPITATION (CHEMISTRY)

Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – 58

PRECISION GUIDED PROJECTILES

Network-Enabled Precision Guided Munitions – 244

PRECISION

Precision Measurement of the Charged Pion Form and Factor – 276

PREDICTION ANALYSIS TECHNIQUES

The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2

PREDICTIONS

An Anticipatory Environment Framework – 301

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308

PRESIDENTIAL REPORTS

Process Improvement in a Radically Changing Organization – 216

PRESSURE PULSES

Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53

PRESSURE REDUCTION

Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 198

PRESSURE SENSORS

High Temperature Characterization of Ceramic Pressure Sensors – 120

PRESSURE VESSEL DESIGN

Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 49

PRESSURE VESSELS

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 39

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48

Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48

PRESSURE

High Temperature Characterization of Ceramic Pressure Sensors – 120

PRESSURIZING

Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – 28

PREVENTION

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160

Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174

PREVENTIVE MAINTENANCE

System and Method for Corrosion Maintenance Scheduling – 62

PRINCIPAL COMPONENTS ANALYSIS

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

PRIORITIES

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 79

PRIVACY

Health Information Technology: Early Efforts Initiated but Comprehensive Privacy Approach Needed for National Strategy – 307

PROBLEM SOLVING

Computational Science: Ensuring America's Competitiveness – 217

PROCUREMENT

Joint Strike Fighter Across the Atlantic: To Unify or Divide – 14

Transitioning Research Concepts to the Command and Control Community Quickly – 80

PROGENY

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

PROGRAM VERIFICATION (COMPUTERS)

Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233

New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228

PROGRAMMING LANGUAGES

FPGAs and HPC – 227

Proving Noninterference and Functional Correctness Using Traces – 222

PROGRESS

Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 4

PROJECT MANAGEMENT

Bridging the Divide between Safety and Risk Management for your Project or Program – 292

Keeping an Operational Perspective in a Network-Centric World – 93

The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33

PROJECTILES

Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114

Transportation Vibration Analysis of the XM982 Projectile – 278

PROPELLANTS

Aging Properties of An HTPB Propellant – 261

Analysis of the Electro spray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56

Apparatus for Study of Ion-Thruster Propellant Ionization – 35

PROPULSION SYSTEM CONFIGURATIONS

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3

Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54

FreedomCAR Advanced Traction Drive Motor Development Phase I. FY 2006 – 108

Unsteady Motions in Combustion Chambers for Propulsion Systems – 113

PROPULSION SYSTEM PERFORMANCE

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3

Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54

Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100

FreedomCAR Advanced Traction Drive Motor Development Phase I. FY 2006 – 108

Unsteady Motions in Combustion Chambers for Propulsion Systems – 113

PROPULSION

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 3

PROSTAGLANDINS

Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185

PROSTATE GLAND

Amplification of Type II Cadherins in Prostate Cancer – 161

Anticancer Inhibitors of AR-Mediated Gene Expression – 172

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Cellular Targets of Dietary Polyphenol Resveratrol – 54

Constitutive Activation of NF-kappaB in Prostate Carcinoma Cells Through a Positive Feedback Loop: Implication of Inducible IKK-Related Kinase (IKKi) – 164

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163

Development of STEAP-based Vaccines for the Treatment of Prostate Cancer – 192

Development of the Meharry Medical College Prostate Cancer Research Program – 191

Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 176

FGF Signaling and Dietary Factors in the Prostate – 175

Function of Periecan Domain 1 in Prostate Cancer – 163

Genes Involved in Oxidation and Prostate Cancer Progression – 186

High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177

Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168

Identification and Validation of PTEN Complex, Associated Proteins – 182

Immune Cells, if Rendered Insensitive to Transforming Growth Factorbeta, Can Cure Prostate Cancer – 195

Intra-Operative Dosimetry in Prostate Brachytherapy – 168

Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165

Microlocalization and Quantitation of Risk Associated Elements in Gleason Graded Prostate Tissue – 175

Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D – 191

Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF_Beta-Insensitive CD8+ T Cells for Treatment of Prostate Cancer – 190

Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 187

Role of PAK6 in Prostate Cancer – 182

Role of TGF-beta in Prostate Cancer Progression – 171

Role of the ARF Tumor Suppressor in Prostate Cancer – 172

Selenoproteins and Prostate Cancer – 170

Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 165

Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy – 170

Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189

Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents – 187

Targeting Stromal Recruitment by Prostate Cancer Cells – 173

Telomere Length as a Predictor of Aggressive Prostate Cancer – 184

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162

Vaccine Immunotherapy for Prostate Cancer – 161

Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

PROTECTION

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 79

Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154

Lightning Protection System for HE Facilities at LLNL-Certification Template – 154

MuVAL Extensions for Dynamic Asset Protection – 234

PROTECTIVE COATINGS

Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 70

Thermal Barrier Coating – 68

PROTECTORS

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 79

PROTEINS

Amplification of Type II Cadherins in Prostate Cancer – 161

Cellular Targets of Dietary Polyphenol Resveratrol – 54

Compositions and Methods for Less Immunogenic Protein Formulations – 46

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163

Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193

Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167

Generation of in Vitro Cellular Models of Lymphangiomyomatosis for the Development of Tuberous Sclerosis Therapeutics – 174

Identification and Validation of PTEN Complex, Associated Proteins – 182

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280

Molecular Characterization of Squamous Cell Carcinomas From Recessive Dysplastic Epidermolysis Bullosa – 194

Protein Microarray System – 46

Purification and Characterization of the Danaus Plexippus Cryptochromes – 173

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170

PROTEOME

Proteomic Analysis of Cisplatin-Resistant Ovarian Cancers – 174

PROTOCOL (COMPUTERS)

A Logical Language for Specifying Cryptographic Protocol Requirements – 245

Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201

Formal Requirements for Key Distribution Protocols – 238

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87

Technical and Economic Assessment of Internet Protocol Version 6 (IPv6) – 212

The NRL Protocol Analyzer: An Overview – 245

PROTONS

Role of Delocalized Charges in the Pyroelectric Effect – 273

Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326

PROTOPLANETARY DISKS

The Birth of Planetary Systems – 309

PROTOTYPES

Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132

US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126

PROVING

Batch Proving and Proof Scripting in PVS – 213

- Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Proving Noninterference and Functional Correctness Using Traces – 222
- PROXIMITY**
Rendezvous and Proximity Operations of the Space Shuttle – 37
- PSYCHOLOGICAL EFFECTS**
An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – 206
- PSYCHOLOGY**
Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308
- PSYCHOTHERAPY**
Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – 166
- PUBLIC HEALTH**
Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 146
- Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- PUBLIC RELATIONS**
Military-Media Relations: Lessons for the Joint Force Commander – 92
- U.S. Army Environmental Center. Fort Dix Community Relations Plan – 308
- PULSE DETONATION ENGINES**
Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54
- PULSED LASERS**
Optical Characterization of Micro Particles in Molecular Plasmas – 56
- PURIFICATION**
Identification and Validation of PTEN Complex, Associated Proteins – 182
- Purification and Characterization of the Danaus Plexippus Cryptochromes – 173
- Purification of Carboxylic Acids by Complexation with Selective Solvents – 43
- PURITY**
Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Slip Activity in Commercial Purity Titanium (CP Ti) – 64
- PYLONS**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114
- PYROELECTRICITY**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- PYROLYSIS**
Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53
- PYROTECHNICS**
Pyrovalve Blowby Tests – 128
- QUADRANTS**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- QUALITY CONTROL**
Implementation of Programmatic Quality and the Impact on Safety – 129
- New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
- Quality Assurance Handbook for Air Pollution Measurement Systems. Volume 2. Ambient Air Specific Methods (Interim Edition) – 140
- QUANTITATIVE ANALYSIS**
A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 316
- QUANTUM CASCADE LASERS**
Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123
- QUANTUM CHROMODYNAMICS**
Calculation of the nucleon axial charge in lattice QCD – 270
- Hadron Structure from Lattice QCD – 276
- High Energy Effective Action from Scattering of QCD Shock Waves – 269
- Inclusive and Exclusive Compton Processes in Quantum Chromodynamics – 277
- Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 271
- QCD Thermodynamics with $N(\text{sub } f)=2+1$ Near the Continuum Limit at Realistic Quark Masses – 275
- Thermodynamics of $(2+1)$ -Flavor QCD – 270
- QUANTUM DOTS**
Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report – 102
- Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- QUANTUM ELECTRODYNAMICS**
QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 269
- QUANTUM WELLS**
Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells – 105
- Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284
- QUANTUM WIRES**
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- QUARKS**
Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 272
- QCD Thermodynamics with $N(\text{sub } f)=2+1$ Near the Continuum Limit at Realistic Quark Masses – 275
- Search for Pentaquarks with CLAS – 272
- QUEUEING THEORY**
Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7
- RADAR CROSS SECTIONS**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74
- RADAR DETECTION**
Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 121
- RADAR EQUIPMENT**
Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 121
- RADAR IMAGERY**
Exploitation of ISAR Imagery in Euler Parameter Space – 74
- Radar Images of Asteroid 100085 (1992 UY4) – 313
- RADAR MEASUREMENT**
Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159
- RADAR SIGNATURES**
Classification of Targets Using Optimized ISAR Euler Imagery – 74
- RADAR TRACKING**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- RADARSAT**
A Simulation Study of Multi-Channel RADARSAT-2 GMTI – 121
- RADIATION DAMAGE**
Space Environment (Natural and Induced) – 328

RADIATION DOSAGE

Chromosome Aberrations in Astronauts – 203

Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – 328

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

Space Environment (Natural and Induced) – 327

RADIATION EFFECTS

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327

RADIATION HAZARDS

Space Environment (Natural and Induced) – 328

RADIATION PROTECTION

Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – 328

RADIATION SOURCES

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56

RADIATIVE TRANSFER

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

RADIATORS

Space Suit Radiator Performance in Lunar and Mars Environments – 324

RADICALS

Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181

RADIO ALTIMETERS

Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22

RADIO ASTRONOMY

Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – 316

RADIO COMMUNICATION

Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 89

RADIO EQUIPMENT

A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 225

Proceedings of the International Symposium on Advanced Radio Technologies. Held in Boulder, Colorado on February 26-28, 2007 – 77

RADIO FREQUENCIES

Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273

RADIO RECEIVERS

R.F. Microphotonics for NASA Space Communications Applications – 31

RADIO STARS

Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – 316

RADIOACTIVE ISOTOPES

Microcantilever Sensors for In-Situ Sub-surface Characterization. 2006 ERSO Annual Report – 53

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

RADIOACTIVE MATERIALS

Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169

RADIOACTIVE WASTES

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their and Influence on Reactive and Transport. 2006 ERSO Annual Report – 53

Selection of Corrosion Resistant Materials for Nuclear Waste Repositories – 59

RADIOBIOLOGY

Space Environment (Natural and Induced) – 328

RADIOLOGY

Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event – 159

RADIOMETERS

Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – 31

RAILGUN ACCELERATORS

A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact – 265

RANDOM ACCESS MEMORY

Bias-Adjusted Magnetoresistive Devices for Magnetic Random Access Memory (MRAM) Applications – 94

RANGEFINDING

GPS – 134

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

RARE EARTH ELEMENTS

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 56

RAWINSONDES

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

REACTION KINETICS

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145

Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr) – 66

REACTIVITY

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their and Influence on Reactive and Transport. 2006 ERSO Annual Report – 53

Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF β -Insensitive CD8⁺ T Cells for Treatment of Prostate Cancer – 190

REAGENTS

Accelerating the Discovery of Effective Photonic Reagents – 45

REAL TIME OPERATION

Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233

Method for Real Time Matched Field Processing – 254

Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213

Summary of the Science performed on-board the International Space Station during Increments 12 and 13 – 309

The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems – 221

RECEIVERS

Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers – 95

Remarks on the New 100-200 Mhz Receiver of the Solar Radio Observatory of the AIP at Tremsdorf Near Potsdam, Germany – 318

RECONNAISSANCE

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149

RECRYSTALLIZATION

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65

RECURSIVE FUNCTIONS

Motion from Fixation – 263

RED SHIFT

On the Prompt Gamma-ray Emission Properties of Short GRBs – 317

REDUCTION (CHEMISTRY)

Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62

REDUNDANCY

Catastrophic Fault Recovery with Self-Reconfigurable Chips – 215

REDUNDANT COMPONENTS

Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 109

REFLECTANCE

Identification Coding Schemes for Modulated Reflectance Systems – 97

REFLECTORS

Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 103

Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

REFUELING

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18

REGIONS

Design and Analysis of Side-Looking Sonar Experiments – 279

NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233

REGRESSION ANALYSIS

A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams – 255

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

REGULATIONS

U.S. Army Environmental Center. Fort Dix Community Relations Plan – 308

RELATIVISTIC EFFECTS

A Magnetohydrodynamic Boost for Relativistic Jets – 117

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

RELATIVISTIC PARTICLES

Structure and Dynamics of GRB Jets – 317

RELIABILITY ANALYSIS

A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119

Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33

Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294

Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN) – 237

Sustainable, Reliable Mission-Systems Architecture – 242

RELIABILITY

Health-Related Quality of Life for Pediatric NF1 Patients – 171

Ultra Reliability Workshop Introduction – 128

REMOTE CONTROL

Network on Target: Remotely Configured Adaptive Tactical Networks – 240

REMOTE SENSING

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137

Heliophysics Science Enabled By the Return to the Moon – 325

Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 149

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

The NASA Orbiting Carbon Observatory – 310

REMOTE SENSORS

Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40

RENDEZVOUS SPACECRAFT

Rendezvous and Proximity Operations of the Space Shuttle – 37

RENEWABLE ENERGY

Role of Renewable Energy in Reducing Greenhouse Gas Buildup. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

REPLACING

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18

War without Oil: A Catalyst for True Transformation – 136

REQUIREMENTS

Network-Centric Operations: Challenges and Pitfalls – 243

The Importance of Multilateral Safety Requirements for Human Spaceflight – 30

RESCUE OPERATIONS

Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195

RESEARCH AND DEVELOPMENT

Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 263

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133

Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230

LNG Safety Research: FEM3A Model Development – 146

National Aeronautics Research and Development Policy – 4

Space Exploration: Challenges in Medicine, Research, and Ethics – 205

RESEARCH FACILITIES

The International Space Station as a Research Laboratory: A View to 2010 and Beyond – 72

The International Space Station: Stepping-stone to Exploration – 323

RESEARCH MANAGEMENT

Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 14

Integrated Cancer Research in Five Thematic Areas of Interest – 176

National Aeronautics Research and Development Policy – 4

RESERVOIRS

Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir – 277

RESIDUES

Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166

RESIN TRANSFER MOLDING

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

RESINS

No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 60

RESOLUTION

Some Examples of Performance of the MDSP Super-Resolution Software (SuperLab) – 282

RESONATORS

Carbon Nanotube Resonator Transistor and Method of Making Same – 109

Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105

RESOURCES MANAGEMENT

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 138

RESPIRATORY DISEASES

Respiratory Disease in Agricultural Workers: Mortality and Morbidity Statistics – 147

RESPONSES

Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157

Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157

RESTORATION

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 187

RETRAINING

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

RETROFITTING

Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49

REVISIONS

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

REYNOLDS NUMBER

A Unified Analytical Look at Reynolds Flocking Rules – 249

RHEA (ASTRONOMY)

Interiors of Enceladus and Rhea – 314

RHENIUM

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

RHYTHM (BIOLOGY)

Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189

RIBONUCLEIC ACIDS

Targeting Stromal Recruitment by Prostate Cancer Cells – 173

RIGIDITY

Motion from Fixation – 263

RISK

Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255

Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177

Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 145

Bridging the Divide between Safety and Risk Management for your Project or Program – 292

International Multidisciplinary Artificial Gravity (IMAG) Project – 199

Microlocalization and Quantitation of Risk Associated Elements in Gleason Graded Prostate Tissue – 175

Review of Methods and Approaches for the Structural Risk Assessment of Aircraft – 15

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

Telomere Length as a Predictor of Aggressive Prostate Cancer – 184

User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – 230

RIVERS

Summary of Survival Data from Juvenile Coho Salmon in the Klamath River, Northern California, 2006 – 256

Use and Benefits of the National Weather Service River and Flood Forecasts – 155

ROADS

Advanced Road Safety and Weather Warning System (ARSAWWS) – 153

On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147

Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153

Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127

Update of the Non-State Trunk Inventory – 236

ROBOTICS

A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79

Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – 244

Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324

Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

ROBOTS

Cooperative Autonomous Mobile Robots – 228

Metrics for Uncertainty in Organizational Decision-Making – 247

Modeling Dynamics and Exploring Control of a Single-Wheeled Dynamically Stable Mobile Robot with Arms – 247

ROBUSTNESS (MATHEMATICS)

A Robust Scalable Transportation System Concept – 237

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285

ROCKET ENGINES

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26

ROCKET NOZZLES

Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131

ROCKET TEST FACILITIES

Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100

RODS

Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report – 53

ROLL FORMING

Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quarterly Technical Progress Report July 1-September 30, 2006 – 60

ROLL

Development of a Passively Deployed Roll-Out Solar Array – 9

ROTARY WINGS

Joint Helicopter Command: The 'Purple' Evolution of Rotary-Wing Aviation – 19

ROTORS

Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – 139

Turbine Engine Rotor Retainer – 21

ROVING VEHICLES

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

RUNWAYS

Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 23

RUPTURING

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48

SAFETY FACTORS

International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310

SAFETY MANAGEMENT

Bridging the Divide between Safety and Risk Management for your Project or Program – 292

SAFETY

Advanced Road Safety and Weather Warning System (ARSAWWS) – 153

Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255

Implementation of Programmatic Quality and the Impact on Safety – 128

LNG Safety Research: FEM3A Model Development – 146

NASA's Software Safety Standard – 231

The Importance of Multilateral Safety Requirements for Human Spaceflight – 30

User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – 230

SALTS

Electrochromic Salts Solutions and Devices – 51

SAMPLE RETURN MISSIONS

Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36

SAMPLERS

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149

SAMPLING

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 78

SATELLITE IMAGERY

Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region – 286

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137

Strategies for Defeating Commercial Imagery Systems – 27

SATELLITE INSTRUMENTS

The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137

SATURN (PLANET)

The Cassini-Huygens Mission Overview – 312

SATURN RINGS

Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313

SCALE MODELS

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74

SCANNING ELECTRON MICROSCOPY

SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321

SCATTERING

High Energy Effective Action from Scattering of QCD Shock Waves – 269

Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 290

SCHEDULES

Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELs) – 219

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

SCHEDULING

A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252

In-Space Crew-Collaborative Task Scheduling – 248

Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229

System and Method for Corrosion Maintenance Scheduling – 62

SCHROEDINGER EQUATION

Numerical Solution of the Extended Non-linear Schrodinger Equation – 286

SCINTILLATION COUNTERS

Comparison of LaBr3:CE and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276

SCINTILLATION

International Heliophysical Year SCINDA Workshop/Abstract – 319

SCORING

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 120

Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120

SEA ICE

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

SEALERS

Low Leakage Finger Seal – 44

SEARCHING

Accelerating the Discovery of Effective Photonic Reagents – 45

SEAS

Air War Beyond the First Island Chain: Implications of China's Military Modernization for U.S. Maritime Strategy – 17

Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 136

SECRETIONS

Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165

SECURITY

Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224

Aviation Security: TSA's Staffing Allocation Model Is Useful for Allocating Staff among Airports, but Its Assumptions Should Be Systematically Reassessed – 4

Biometric Collection, Transmission and Storage Standards. Version 1.1 – 232

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296

Data Dependence Analysis for an Untrusted Transaction Manager – 295

Formal Requirements for Key Distribution Protocols – 238

Global Warming and the Combatant Commander: Engaging the Arctic Region – 135

Global-Warming: A National Security Issue – 151

How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security? – 17

Identifying Potential Implications of Technologies on Military and Security Options – 261

In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 83

Increasing Assurance with Literate Programming Techniques – 295

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations – 305

Operationalizing Defense Support to Public Diplomacy – 93

Short Message Service (SMS) Security Solution for Mobile Devices – 228

- The National Biometrics Challenge – 210
- The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil – 70
- The Proliferation Security Initiative: Co-operative Process or Command and Control Nightmare? – 88
- SEDATIVES**
- Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendmiddelen in marmosetapen) – 201
- Sleep and Alertness Management – 200
- SEDIMENT TRANSPORT**
- XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- SEGMENTED MIRRORS**
- Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285
- SEGMENTS**
- Entropy Based Classifier Combination for Sentence Segmentation – 78
- SEISMOLOGY**
- Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 150
- SEMANTICS**
- Proving Noninterference and Functional Correctness Using Traces – 223
- SEMICONDUCTOR DEVICES**
- Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- SEMICONDUCTOR LASERS**
- Emissions Control in Swirl-Stabilized Combustors – 125
- High Power Mid Wave Infrared Semiconductor Lasers – 124
- Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- SEMICONDUCTORS (MATERIALS)**
- Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
- Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42
- Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells – 104
- Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- SENSITIVITY**
- A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324
- Structure Mapping in Visual Displays for Decision Support – 300
- Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- SENSORS**
- Emissive Sensors and Devices Incorporating These Sensors – 96
- International Heliophysical Year SCINDA Workshop/Abstract – 319
- Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- Pattern Transfer with Self-Similar Sacrificial Mask Layer and Vector Magnetic Field Sensor – 98
- Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20
- SENTENCES**
- Comparing Evaluation Metrics for Sentence Boundary Detection – 75
- Entropy Based Classifier Combination for Sentence Segmentation – 78
- SENTINEL SYSTEM**
- Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58
- SEPARATION**
- Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- SEQUENCING**
- From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311
- The Cassini-Huygens Sequence Development Process – 310
- SERUMS**
- Serum Genetic Markers as Surrogates of Prostate Cancer Progression – 166
- SET THEORY**
- Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective – 264
- SHALLOW WATER**
- Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 120
- Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120
- SHAPES**
- Comparative Analysis of Kernel Methods for Statistical Shape Learning – 245
- Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – 285
- Particle Filtering With Dynamic Shape Priors – 251
- Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246
- SHEAROGRAPHY**
- Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- SHEATHS**
- 3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 118
- SHELTERS**
- Human Research Program: Space Human Factors and Habitability Element – 210
- SHIPS**
- Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232
- The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery – 5
- SHOCK TUBES**
- Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53
- SHOCK WAVE INTERACTION**
- The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- SHOCK WAVES**
- High Energy Effective Action from Scattering of QCD Shock Waves – 269
- Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2
- SHOULDERS**
- Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – 204
- SIGNAL ANALYSIS**
- Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- SIGNAL PROCESSING**
- Joint Demodulation of Low-Entropy Narrowband Cochannel Signals – 119
- Method for Real Time Matched Field Processing – 254
- SIGNAL TO NOISE RATIOS**
- Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106
- SIGNAL TRANSMISSION**
- Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107
- SIGNALS**
- Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 109
- Phantom for Production of Controllable FMRI Signal – 97

SIGNATURES

CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 122

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186

SIGNS AND SYMPTOMS

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

SILICON CARBIDES

Q5 Known Good Substrates – 103

SILICON DIOXIDE

Silica Extraction at the Mammoth Lakes Geothermal Site – 67

Vapor Depositon of Silicon Dioxide Nanolaminates – 38

SILICON

Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – 59

Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56

SILVER

Silver Crystals Through Tollen's Reaction – 44

SIMULATION

3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 118

A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225

A Magnetohydrodynamic Boost for Relativistic Jets – 116

A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119

A Simulation Study of Multi-Channel RADARSAT-2 GMTI – 121

AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223

Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266

An Agent-Based Simulation Model for Organizational Analysis – 86

An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231

Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259

Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82

Command World – 80

Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 21

Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229

Effects of Finite Sample Width on Transition and Flame Spread in Microgravity – 70

Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3

Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software – 164

Fidelity versus Cost and Its Effect on Modeling and Simulation – 227

General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319

Leveraging Simulation Against the F-16 Flying Training Gap – 8

Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65

Model-Based Organization Analysis and Design for an ESG Organization – 258

Modeling Intelligent C2 Using Technology of Multi-Agent – 83

Multidisciplinary Computational Research – 251

NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288

Phantom for Production of Controllable FMRI Signal – 97

Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227

Radio Path Prediction Software for Command and Control Scenario Developers – 259

Representing the Human Decision Maker in Combat Identification – 298

Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266

Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN) – 237

Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232

SUPG Finite Element Simulations of Compressible Flows – 112

Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84

Traffic Engineering Applications of Driving Simulation – 211

SIMULATORS

AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 224

CAISSON: Interconnect Network Simulator – 237

Fidelity versus Cost and Its Effect on Modeling and Simulation – 227

Traffic Engineering Applications of Driving Simulation – 211

SINGLE CRYSTALS

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

SINGLE EVENT UPSETS

Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34

SINGULAR INTEGRAL EQUATIONS

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

SINGULARITY (MATHEMATICS)

Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – 99

Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250

SITUATIONAL AWARENESS

An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231

Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79

Maintaining Situational Awareness in Large, Complex Organizations – 297

Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300

Organizational Change for Improved C2 in the Information Age – 84

Situation Awareness and Fatigue Sensing – 203

Situation Awareness for Cyber Defense – 301

SIZE DISTRIBUTION

An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris – 30

SKY BRIGHTNESS

Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 151

SLEEP DEPRIVATION

Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 169

Modeling Performance in C4ISR Sustained Operations: A Multi-level Approach – 196

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendemiddelen in marmosetapen) – 201

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

SLEEP

Causes and Effects of Fatigue in Experienced Military Aircrew – 6

Sleep and Alertness Management I: Pharmacokinetics of Hypnotics and Alertness Enhancers in Marmoset Monkeys (slaap- en alertheidsmanagement I: farmacokinetiek van slaap- en alertheidsverhogendemiddelen in marmosetapen) – 201

Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199

Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

Sleep and Alertness Management – 200

SLICING

Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 131

SLOTS

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87

SOFTWARE DEVELOPMENT TOOLS

AOC Embedded Performance Measurement and Assessment – 228

Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32

Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220

Integrated, Kerberized Login on MacOS X – 221

NASA Software Estimating Tool (NSET) – 218

On Applying Point-Interval Logic to Criminal Forensics (Student Paper) – 264

Operational Thread Development: A Structured Approach to Capability Analysis – 225

Radio Path Prediction Software for Command and Control Scenario Developers – 259

SOFTWARE ENGINEERING

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218

Automatic Generation of State Invariants from Requirements Specifications – 216

Computational Science: Ensuring America's Competitiveness – 217

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

NASA's Software Safety Standard – 231

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

Process Improvement in a Radically Changing Organization – 216

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) – 221

Software Development Cost Estimation Executive Summary – 256

Some Examples of Performance of the MDSP Super-Resolution Software (SuperLab) – 282

Specification for Visual Requirements of Work-Centered Software Systems – 223

The Cassini-Huygens Sequence Development Process – 310

SOFTWARE RELIABILITY

Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233

SOILS

Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51

Detecting Life and Biology-Related Parameters on Mars – 196

Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73

SOLAR ACTIVITY EFFECTS

Challenges to modeling the Sun-Earth System: A Workshop Summary – 158

SOLAR ACTIVITY

Challenges to modeling the Sun-Earth System: A Workshop Summary – 158

Coupled Groups of g-Modes in a Sun with Mixed Core – 326

Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 132

SOLAR ARRAYS

Development of a Passively Deployed Roll-Out Solar Array – 9

SOLAR CELLS

Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140

Development of a Passively Deployed Roll-Out Solar Array – 9

Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55

Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326

SOLAR ELECTRIC PROPULSION

Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36

SOLAR OBSERVATORIES

Remarks on the New 100-200 Mhz Receiver of the Solar Radio Observatory of the AIP at Tremsdorf Near Potsdam, Germany – 318

SOLAR PHYSICS

European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 319

On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327

SOLAR RADIATION

Space Environment (Natural and Induced) – 328

SOLAR SAILS

Solar Sail Model Validation from Echo Trajectories – 37

SOLAR SIMULATORS

Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326

SOLAR SYSTEM EVOLUTION

The Birth of Planetary Systems – 309

SOLAR SYSTEM

Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – 315

SOLAR TERRESTRIAL INTERACTIONS

Challenges to modeling the Sun-Earth System: A Workshop Summary – 158

SOLAR WIND

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326

SOLENOIDS

Development of the Butt Joint for the ITER Central Solenoid – 274

- Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- SOL-GEL PROCESSES**
Method for Making Sol Gel Spacers for Flat Panel Displays – 95
- SOLID LUBRICANTS**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- SOLID PROPELLANT ROCKET ENGINES**
An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris – 30

Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hangups – 129
- SOLID STATE DEVICES**
Solid State High Power Device and Method – 96
- SOLID STATE**
Solid State High Power Device and Method – 96
- SOLID SURFACES**
Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
- SOLID WASTES**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 145

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143
- SOLVENTS**
Purification of Carboxylic Acids by Complexation with Selective Solvents – 44
- SONAR**
Design and Analysis of Side-Looking Sonar Experiments – 279

Dynamic Response of an Insonified Sonar Window Interacting with a Tonpiz Transducer Array – 103

Method for Real Time Matched Field Processing – 254
- SORBENTS**
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 147
- SORPTION**
Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166
- SOUND WAVES**
Castable and High Modulus Acoustic Dampening Material – 306
- SPACE COMMUNICATION**
R.F. Microphotonics for NASA Space Communications Applications – 31
- SPACE DEBRIS**
A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324

An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris – 30

Improvements to NASA's Debris Assessment Software – 215
- SPACE EXPLORATION**
A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 233

Cross Cutting Structural Design for Exploration Systems – 325

Implementation of Programmatic Quality and the Impact on Safety – 128

In-Space Crew-Collaborative Task Scheduling – 248

Space Exploration: Challenges in Medicine, Research, and Ethics – 205

The International Space Station: Stepping-stone to Exploration – 323
- SPACE INFRARED TELESCOPE FACILITY**
Spitzer Pre Launch Mission Operations System - The Road to Launch – 314
- SPACE LOGISTICS**
External Cargo Integration Overview – 30
- SPACE MISSIONS**
A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24

A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218

Catastrophic Fault Recovery with Self-Reconfigurable Chips – 215

Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36

Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134

NASA's Spitzer Space Telescope's Operational Mission Experience – 314

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

Spitzer Pre Launch Mission Operations System - The Road to Launch – 314

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321

Toward a Framework for Modeling Space Systems Architectures – 236
- SPACE NAVIGATION**
Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 35
- SPACE PLASMAS**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 289
- SPACE PROBES**
The Cassini-Huygens Mission Overview – 312
- SPACE RATIONS**
Human Research Program: Space Human Factors and Habitability Element – 210
- SPACE RENDEZVOUS**
Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- SPACE SHUTTLE MISSIONS**
Rendezvous and Proximity Operations of the Space Shuttle – 37
- SPACE SHUTTLES**
Comprehensive Shuttle Foam Debris Reduction Strategies – 50

Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26

Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 31
- SPACE SUITS**
Space Suit Radiator Performance in Lunar and Mars Environments – 324
- SPACE SURVEILLANCE (SPACEBORNE)**
Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60
- SPACE WEAPONS**
Air Force Space Doctrine: Is It Ready for Weapons in Space? – 29

Operational Art for Space Control: Do the Principles of War Apply – 28

Space Power Integration: Perspectives from Space Weapons Officers – 27

Sustained Space Superiority: A National Strategy for the USA – 27

Whither Space Weapons: A Capability in Need of an Advocate – 26
- SPACEBORNE TELESCOPES**
NASA's Spitzer Space Telescope's Operational Mission Experience – 314
- SPACECRAFT CONSTRUCTION MATERIALS**
Comprehensive Shuttle Foam Debris Reduction Strategies – 50

Exploration Life Support: ELS Functions and Materials Interfaces – 207

- Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32
- SPACECRAFT CONTROL**
‘Fly-by-Wireless’: A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – 34
- SPACECRAFT DESIGN**
Cross Cutting Structural Design for Exploration Systems – 325
The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33
- SPACECRAFT GUIDANCE**
International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 32
- SPACECRAFT LAUNCHING**
Spitzer Pre Launch Mission Operations System - The Road to Launch – 314
- SPACECRAFT MAINTENANCE**
International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 32
- SPACECRAFT MODELS**
Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32
- SPACECRAFT RADIATORS**
Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – 32
- SPACECREWS**
Human Research Program: Space Human Factors and Habitability Element – 210
In-Space Crew-Collaborative Task Scheduling – 248
Nutritional Status Assessment (SMO 016E) – 203
- SPACERS**
Method for Making Sol Gel Spacers for Flat Panel Displays – 95
Turbine Engine disk Spacers – 21
- SPATIAL DISTRIBUTION**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
The Orbiting Carbon Observatory: Mission Overview – 311
- SPECIFICATIONS**
Specification for Visual Requirements of Work-Centered Software Systems – 223
- SPECTRA**
Light Baryon Spectrum using Improved Interpolating Operators – 270
On the Prompt Gamma-ray Emission Properties of Short GRBs – 316
- SPECTROGRAPHS**
NASA’s Spitzer Space Telescope’s Operational Mission Experience – 314
- SPECTROMETERS**
Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106
Ion Mobility Spectrometry Method and Apparatus – 266
- SPECTROSCOPY**
A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 316
Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280
Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279
System and Method of Use for Electrochemical Measurement of Corrosion – 65
- SPECTRUM ANALYSIS**
Environmental Technology Verification Report: Field Portable X-ray Fluorescence Analyzer. Niton XL Spectrum Analyzer – 141
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- SPEECH RECOGNITION**
Comparing Evaluation Metrics for Sentence Boundary Detection – 75
Entropy Based Classifier Combination for Sentence Segmentation – 78
- SPENT FUELS**
Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169
- SPHERES**
Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126
- SPHERULES**
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
- SPINDLES**
Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193
- SPIN**
Exotic and Higher Spin Mesons in Charmonium – 271
- SPRAYERS**
Emissions Control in Swirl Stabilized Spray Combustors, an Experimental and Computational Study – 75
Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 115
Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67
- STABILITY**
Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123
Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations – 305
Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region – 1
Unsteady Motions in Combustion Chambers for Propulsion Systems – 113
- STAGNATION FLOW**
Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – 32
- STANDARDIZATION**
Standardizing an End-to-end Accounting Service – 72
- STANDARDS**
NASA’s Software Safety Standard – 231
- STAR FORMATION**
The Birth of Planetary Systems – 309
- STARDUST MISSION**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320

STARS

Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – [12](#)

STATIC MODELS

Solving the Quasi-Static Field Model of the Pulse-Line Accelerator; Relationship to a Circuit Model – [267](#)

STATISTICAL ANALYSIS

Statistical Density Modification Using Local Pattern Matching – [215](#)

U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations – [254](#)

STEELS

c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – [61](#)

Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – [61](#)

Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – [62](#)

STEERING

Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – [59](#)

STELLAR ATMOSPHERES

Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – [315](#)

STELLAR EVOLUTION

The Birth of Planetary Systems – [309](#)

STELLAR SYSTEMS

Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – [315](#)

STEM CELLS

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – [188](#)

STIMULANTS

Sleep and Alertness Management – [200](#)

STIMULATION

Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – [179](#)

STIRLING ENGINES

Control of Dual-Opposed Stirling Converters with Active Power Factor Correction Controllers – [101](#)

STOCHASTIC PROCESSES

Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – [87](#)

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – [22](#)

Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation – [12](#)

STORMS

Windstorm Impact Reduction Implementation Plan – [152](#)

STRANDS

Durable Wood Composites for Naval Low-Rise Buildings – [49](#)

STRATA

Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – [147](#)

STRATEGY

Cognitive Constructs and the Sensemaking Process – [86](#)

Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs – [92](#)

STRATOSPHERE

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – [133](#)

STRESS ANALYSIS

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – [48](#)

STRESS INTENSITY FACTORS

Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration – [16](#)

STRESS (PHYSIOLOGY)

Workload and Stress of Crews Operating Future Manned Vehicles – [229](#)

STRESS (PSYCHOLOGY)

An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – [206](#)

Workload and Stress of Crews Operating Future Manned Vehicles – [229](#)

STRESS-STRAIN RELATIONSHIPS

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – [290](#)

STRONTIUM TITANATES

Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – [103](#)

STRUCTURAL ANALYSIS

Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – [80](#)

Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – [1](#)

STRUCTURAL DESIGN

Geopolymers for Structural Ceramic Applications – [68](#)

Review of Methods and Approaches for the Structural Risk Assessment of Aircraft – [15](#)

STRUCTURAL ENGINEERING

Finding the Right Measures of Effectiveness for Rebuilding the State of Iraq – [130](#)

STRUCTURAL FAILURE

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – [130](#)

STRUCTURAL STRAIN

Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – [48](#)

STUDENTS

On Applying Point-Interval Logic to Criminal Forensics (Student Paper) – [264](#)

SUBSTRATES

Method and System for Transferring a Patterned Material – [109](#)

Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – [265](#)

Q5 Known Good Substrates – [103](#)

Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – [55](#)

Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – [327](#)

SULFATES

Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – [322](#)

SULFUR DIOXIDES

Finding of No Significant Impact: Tennessee Valley Authority Installation of Flue Gas Desulfurization System on Kingston Fossil Plant, Roane County, Tennessee – [144](#)

SULFUR OXIDES

Final Environmental Assessment: Installation of Flue Gas Desulfurization System at Kingston Fossil Plant, Roane County, Tennessee – [144](#)

SULFUR

Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – [322](#)

SUMMER

Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report – [121](#)

Undergraduate Summer Training Program in Breast Cancer Imaging – [171](#)

SUNLIGHT

The Orbiting Carbon Observatory: Mission Overview – [311](#)

SUN

Challenges to modeling the Sun-Earth System: A Workshop Summary – [158](#)

SUPERCONDUCTIVITY

Development of the Butt Joint for the ITER Central Solenoid – 274

SUPERCritical FLOW

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 39

SUPERCritical FLUIDS

High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 39

SUPERHIGH FREQUENCIES

Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 137

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73

SUPERNOVAE

A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 316

SUPERSONIC COMBUSTION RAMJET ENGINES

Applying MHD Results to a Scramjet Vehicle – 287

Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272

SUPERSONIC COMBUSTION

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114

SUPERSONIC FLOW

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114

The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117

SUPPORT SYSTEMS

Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration – 16

Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 9

Executable Architectures for Modeling Command and Control Processes – 241

JCAS: Psst, the 'J' Stands for Joint – 88

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81

Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle – 90

SUPPRESSORS

Role of the ARF Tumor Suppressor in Prostate Cancer – 173

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162

SURFACE EMITTING LASERS

High Power Mid Wave Infrared Semiconductor Lasers – 125

Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122

SURFACE LAYERS

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

SURFACE ROUGHNESS

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73

SURFACE TREATMENT

Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments – 15

SURFACE VEHICLES

IAM Slutrapport 2005 (IAM Annual Report 2005) – 278

Virtual Pan/Tilt Camera System and Method for Vehicles – 98

SURGES

Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 127

SURVEILLANCE

Noise Radar Technology Basics – 118

The Way Ahead For Maritime UAVS – 19

SURVEYS

Exploring the Relationship Between Distributed Training, Integrated Learning Environments, and Immersive Training Environments – 247

SURVIVAL

Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 187

Summary of Survival Data from Juvenile Coho Salmon in the Klamath River, Northern California, 2006 – 256

SWITCHING CIRCUITS

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

SWITCHING

Integrated, Kerberized Login on MacOS X – 221

SYNCHRONISM

A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2 – 301

SYNCHRONOUS METEOROLOGICAL SATELLITE

Short Message Service (SMS) Security Solution for Mobile Devices – 228

SYNCHROTRON RADIATION

Geopolymers for Structural Ceramic Applications – 68

SYNTHETIC APERTURE RADAR

A Simulation Study of Multi-Channel RADARSAT-2 GMTI – 121

CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121

Noise Radar Technology Basics – 118

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

SYSTEM EFFECTIVENESS

Advanced Visualization for Operational Assessment (Briefing Charts) – 258

Comparing Evaluation Metrics for Sentence Boundary Detection – 74

Evaluations of QMI After-Market Additives – 7

Experiments into the Operation and Effectiveness of Edge Organizations – 90

Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168

New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228

PERSUADE: Modeling Framework for the Design of Modular Army Organizations – 224

Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 119

Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120

Transportability Testing of the Joint Modular Intermodal Platform (JMIP), TP-94-01, Transportability Testing Procedures – 127

Transportation Vibration Analysis of the XM982 Projectile – 278

SYSTEMS ANALYSIS

An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 302

Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images – 212

Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259

Developing a Viable Approach for Effective Tiered Systems – 262

Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262

SYSTEMS ENGINEERING

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218

Bismuth Propellant Feed System Development at NASA-MSFC – 71

Built But Not Used, Needed But Not Built: Ground System Guidance Based On Cassini-Huygens Experience – 219

Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System – 276

Control Reconfiguration of Command and Control Systems – 92

Cross Cutting Structural Design for Exploration Systems – 325

Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System – 14

Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197

Executable Architectures for Modeling Command and Control Processes – 241

From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge – 217

Gruppantennteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81

Method and System for Extensible Position Location – 214

Net-Centric, Enterprise-Wide System-of-Systems Engineering and the Global Information Grid – 260

On Access Checking in Capability-Based Systems – 235

Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220

Pyrovalve Blowby Tests – 128

Towards a Framework for Modeling Space Systems Architectures – 220

Validating DoD Architectures: The Promise of Systems Engineering – 239

'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – 34

SYSTEMS INTEGRATION

A Robust Scalable Transportation System Concept – 237

Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218

External Cargo Integration Overview – 30

Integrated Cancer Research in Five Thematic Areas of Interest – 176

Support for Dynamic Collaborative Action Teams – 232

TACTICS

An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 302

Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations – 305

TANGENTS

Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65

TANKER AIRCRAFT

Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18

TANTALUM

Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 62

TARGET ACQUISITION

Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248

TARGET RECOGNITION

Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229

TARGETS

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Cellular Targets of Dietary Polyphenol Resveratrol – 54

Classification of Targets Using Optimized ISAR Euler Imagery – 74

Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229

Exploitation of ISAR Imagery in Euler Parameter Space – 74

Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final – 288

Network on Target: Remotely Configured Adaptive Tactical Networks – 240

Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy – 170

Structure Mapping in Visual Displays for Decision Support – 300

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

TASKS

In-Space Crew-Collaborative Task Scheduling – 249

Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81

TEAMS

Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7

Support for Dynamic Collaborative Action Teams – 232

TECHNETIUM

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

TECHNOLOGICAL FORECASTING

Defense Science Board 2006 Summer Study on 21st Century Strategic Technology Vectors. Volume 1: Main Report – 121

TECHNOLOGIES

Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 134

TECHNOLOGY ASSESSMENT

Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward – 85

Developing a Viable Approach for Effective Tiered Systems – 262

Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58

Improvements to NASA's Debris Assessment Software – 215

TECHNOLOGY TRANSFER

The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 309

TECHNOLOGY UTILIZATION

Cross Cutting Structural Design for Exploration Systems – 325

Gruppantenneteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89

Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool – 11

TECTONICS

Interiors of Enceladus and Rhea – 314

TELECOMMUNICATION

Array of Laminated Waveguides for Implementation in LTCC Technology – 110

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 78

Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) – 221

Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77

Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs – 92

The Communications of Influence through Technology-Enabled Media – 76

TELEMETRY

A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219

Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77

Standardizing an End-to-end Accounting Service – 72

TELESCOPES

Low-cost Large Aperture Telescopes for Optical Communications – 284

TELEVISION SYSTEMS

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Dies of Complications After Receiving Severe Electrical Shock Installing a TV Tower – 101

TELLURIDES

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broad-band Sources – 56

TELOMERES

Telomere Length as a Predictor of Aggressive Prostate Cancer – 184

TEMPERATURE DEPENDENCE

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

TEMPERATURE EFFECTS

Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64

TEMPERATURE MEASUREMENT

Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 150

TEMPERATURE PROFILES

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312

TEMPLATES

Enzymatic Template Polymerization – 40

Lightning Protection System for HE Facilities at LLNL-Certification Template – 154

TEMPORAL DISTRIBUTION

The Orbiting Carbon Observatory: Mission Overview – 311

TENNESSEE VALLEY (AL-KY-TN)

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4 – 142

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

TENNESSEE

Final Environmental Assessment: Selective Noncatalytic Reduction Project, Johnsonville Fossil Plant, Units 1-4, Humphreys County, Tennessee – 143

Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143

TENSILE STRESS

Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32

TERRAIN ANALYSIS

Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 74

TERRAIN

Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 138

Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134

Mapping the Future: Optimizing Joint Geospatial Engineering Support – 135

Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22

TERRORISM

A System Shock Approach to Modelling Clandestine Network Disruption – 78

Africa Command: An Interagency Solution and SOF's Role – 138

Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event – 159

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

TEST EQUIPMENT

Trials Lessons Learned: DRDC Ottawa Propagation Measurements and Support for DLCSMP Trials 9-10 January 06 – 76

TEST FACILITIES

CFD Modeling Activities at the NASA Stennis Space Center – 113

Pyrovalve Blowby Tests – 128

Space Suit Radiator Performance in Lunar and Mars Environments – 323

TEST STANDS

Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes – 208

TEXAS

Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 146

TEXTS

Tandem Learning: A Learning Framework for Document Categorization – 295

The Impact of Synchronous Text-Based Chat on Military Command and Control – 81

The Mission Transcript Collection: U.S. Human Spaceflight Missions from Mercury Redstone 3 to Apollo 17 – 321

TEXTURES

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

THEOREMS

Batch Proving and Proof Scripting in PVS – 213

THERAPY

Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188

AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163

Endocrine Therapy of Breast Cancer – 183

Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy – 170

Targeting Mechanisms of Resistance to Taxane-Based Chemotherapy – 159

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175

Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185

XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188

THERMAL CONDUCTIVITY

Thermal Barrier Coating – 69

THERMAL CONTROL COATINGS

Thermal Barrier Coating – 69

THERMAL EXPANSION

Geopolymers for Structural Ceramic Applications – 68

THERMAL PROTECTION

International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 32

THERMAL RADIATION

Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100

THERMAL VACUUM TESTS

Space Suit Radiator Performance in Lunar and Mars Environments – 324

THERMODYNAMIC EQUILIBRIUM

Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312

THERMODYNAMICS

Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58

QCD Thermodynamics with $N_f=2+1$ Near the Continuum Limit at Realistic Quark Masses – 275

Thermodynamics of $(2+1)$ -Flavor QCD – 270

THERMONUCLEAR REACTIONS

Development of the Butt Joint for the ITER Central Solenoid – 274

THERMOPLASTIC RESINS

Design and Analysis of Thermoplastic Composite Bridge Superstructures – 48

THERMOPLASTICITY

Design and Analysis of Thermoplastic Composite Bridge Superstructures – 48

THERMOSPHERE

Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 133

THICK FILMS

Method for Making Sol Gel Spacers for Flat Panel Displays – 95

THICKNESS

Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39

THIN FILMS

Apparatus and Method for Coupling Light to a Thin Film Optical Waveguide – 99

Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 290

THREADS

Operational Thread Development: A Structured Approach to Capability Analysis – 225

Thin Thread Analysis – 258

THREE DIMENSIONAL FLOW

3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 118

THREE DIMENSIONAL MODELS

MOSSFRAC: An Anisotropic 3D Fracture Model – 43

THRUST VECTOR CONTROL

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 115

TIME DEPENDENCE

A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253

Dynamic Decision Support for Time Critical Targeting – 7

Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323

TIME SERIES ANALYSIS

Analysis of Particulate Nitrate and Black Carbon Time Series – 142

TISSUE ENGINEERING

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187

TITANIUM ALLOYS

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 65

TITANIUM CARBIDES

Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63

TITANIUM

Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290

Slip Activity in Commercial Purity Titanium (CP Ti) – 64

TOMOGRAPHY

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130

TOPOGRAPHY

Extraction and Rendering Techniques for Digital Charting Databases – 136

Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159

TOPOLOGY

Network on Target: Remotely Configured Adaptive Tactical Networks – 240

Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes – 208

Workshop: Theory and Applications of Coupled Cell Networks – 256

XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244

TORCHES

A Microwave-Augmented Plasma Torch Module – 287

TOUCH

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

TOWERS

Fatality Assessment and Control Evaluation (FACE) Report for Indiana: Laborer Dies of Complications After Receiving Severe Electrical Shock Installing a TV Tower – 101

TOXIC DISEASES

Base De Fuerza Aerea, East Kelly, San Antonio, Condado De Bexar, Texas, 27 De Febrero, 2007. EPA Facility ID: TX2571724333 (Public Health Assessment for East Kelly Air Force Base, San Antonio, Bexar County, Texas, February 27, 2007. EPA Facility ID: TX2571724333) – 146

TOXICITY

Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58

JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173

TOXINS AND ANTITOXINS

JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173

TRACKING (POSITION)

Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320

Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120

Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107

Noise Radar Technology Basics – 118

TRACTION

FreedomCAR Advanced Traction Drive Motor Development Phase I. FY 2006 – 108

TRAFFIC

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 78

Traffic Engineering Applications of Driving Simulation – 211

TRAJECTORIES

Solar Sail Model Validation from Echo Trajectories – 37

TRAJECTORY CONTROL

Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 15

TRANSDUCERS

Dynamic Response of an Insonified Sonar Window Interacting with a Tonpilz Transducer Array – 104

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

TRANSFERRING

Method and System for Transferring a Patterned Material – 109

TRANSFORMATIONS (MATHEMATICS)

An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253

TRANSFORMERS

A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272

Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System – 276

TRANSISTORS

Carbon Nanotube Resonator Transistor and Method of Making Same – 109

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

TRANSMISSION

Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291

TRANSMITTER RECEIVERS

Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation: Embedded (OSSIE) – 221

TRANSPORT PROPERTIES

Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 194

Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324

TRANSPORT THEORY

Hole Transport Layer Compositions and Related Diode Devices – 95

TRANSPORTATION NETWORKS

Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 78

TRANSPORTATION

Aviation Security: TSA's Staffing Allocation Model Is Useful for Allocating Staff among Airports, but Its Assumptions Should Be Systematically Reassessed – 5

Transportation Vibration Analysis of the XM982 Projectile – 278

TRAPS

Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283

TRAVELING WAVE TUBES

Congressional-Microwave Vacuum Electronics Power Res. Ini.) TWT Coatings Improvement Investigation – 107

TREADMILLS

2nd ISS Treadmill Development 'T2 Project' – 207

TRENDS

How Clean Is the Air: Tennessee Valley Air Quality Trends. ('On the Air' Technical Notes on Important Air Quality Issues) – 141

TRIBOLOGY

Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63

TROPICAL REGIONS

A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137

Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133

TSUNAMI WAVES

Leveraging C2IEDM for Enhancing Systems Interoperability – 151

TUMOR SUPPRESSOR GENES

The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183

TUMORS

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187

Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180

Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178

Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194

Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188

Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D – 191

Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF β -Insensitive CD8+ T Cells for Treatment of Prostate Cancer – 190

Role of the ARF Tumor Suppressor in Prostate Cancer – 172

Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189

Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193

Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178

Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162

TUNABLE LASERS

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55

TUNGSTEN

Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 57

TUNING

Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV – 11

High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – 125

TUNNEL JUNCTIONS

Pseudo Tunnel Junction – 265

Separate Write and Read Access Architecture for a Magnetic Tunnel Junction – 94

TURBINE BLADES

Triple Circuit Turbine Blade – 35

TURBINE ENGINES

Turbine Engine disk Spacers – 21

Turbine Engine Rotor Retainer – 21

TURBINES

Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139

Thermal Shield Turbine Airfoil – 1

TURBULENCE

Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264

Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

TURBULENT FLOW

Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313

TYROSINE

FGF Signaling and Dietary Factors in the Prostate – 175

Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181

UKRAINE

International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006 – 42

ULTRASONIC RADIATION

Dynamic Response of an Insonified Sonar Window Interacting with a Tonpiz Transducer Array – 104

ULTRASONICS

Integrated High Voltage Switching Circuit for Ultrasound Transducer Array – 96

ULTRAVIOLET LASERS

Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122

UNDERWATER VEHICLES

Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV – 11

Design and Analysis of Side-Looking Sonar Experiments – 279

Low-Drag Hydrodynamic Surfaces – 115

UNITED STATES

Computational Science: Ensuring America's Competitiveness – 217

Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296

National Aeronautics Research and Development Policy – 4

Sustained Space Superiority: A National Strategy for the USA – 27

The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil – 70

UNIVERSITIES

Development of the Meharry Medical College Prostate Cancer Research Program – 191

UPLINKING

A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219

Built But Not Used, Needed But Not Built: Ground System Guidance Based On Cassini-Huygens Experience – 219

From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311

UPPER ATMOSPHERE

European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 319

UPSTREAM

Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114

URANIUM

Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169

URINE

Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162

USER MANUALS (COMPUTER PROGRAMS)

The SWANSURF Wave Model Implementation and User Manual – 221

USER REQUIREMENTS

Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 10

Thin Thread Analysis – 258

VACCINES

Development of STEAP-based Vaccines for the Treatment of Prostate Cancer – 192

Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 176

Vaccine Immunotherapy for Prostate Cancer – 161

VACUUM SYSTEMS

Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60

VACUUM

Congressional-Microwave Vacuum Electronics Power Res. Ini.) TWT Coatings Improvement Investigation – 107

VALVES

Pyrovalve Blowby Tests – 128

VANADIUM ALLOYS

Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63

VAPOR DEPOSITION

Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41

Vapor Deposition of Silicon Dioxide Nanolaminates – 38

VAPORS

Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40

Vapor Deposition of Silicon Dioxide Nanolaminates – 38

VARIABILITY

Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 65

VEGETATION

Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148

VERNIER ENGINES

Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26

VERY LARGE ARRAY (VLA)

Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – 316

VERY LONG BASE INTERFEROMETRY

GPS – 134

VESTIBULES

Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6

VIBRATION DAMPING

Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3

VIBRATION METERS

Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – 59

VIBRATIONAL STRESS

Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129

VIBRATION

Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106

Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285

Transportation Vibration Analysis of the XM982 Projectile – 278

VIDEO SIGNALS

Airport Security System – 10

VIRAL DISEASES

Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162

High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 179

VIRULENCE

Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197

VIRUSES

A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – 190

Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163

Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204

VISCOELASTICITY

An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253

Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260

VISCOSITY

Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47

VISUAL ACUITY

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

VISUAL AIDS

Specification for Visual Requirements of Work-Centered Software Systems – 223

VISUAL PERCEPTION

Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm – 208

VISUAL STIMULI

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104

VOICE COMMUNICATION

A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams – 255

The Communications of Influence through Technology-Enabled Media – 76

VOIDS

Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39

VOLCANOES

Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 150

Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131

VOLTAGE REGULATORS

Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – 95

VULNERABILITY

Architectural Vulnerabilities of Third-Generation Portable Devices – 242

Military Role in Space Control: A Primer – 24

Space Dependence - A Critical Vulnerability of the Net-Centric Operational Commander – 28

The Civil Reserve Air Fleet: A Vulnerable National Asset – 16

WAFERS

Q5 Known Good Substrates – 103

WARFARE

A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238

Africa Command: An Interagency Solution and SOF's Role – 138

Air Force Space Doctrine: Is It Ready for Weapons in Space? – 29

Air War Beyond the First Island Chain: Implications of China's Military Modernization for U.S. Maritime Strategy – 16

Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward – 84

An Operational Commander's Guide to the Media – 91

An Operational Framework for Battle in Network Space – 24

Chemical and Biological Defense: Updated Intelligence, Clear Guidance, and Consistent Priorities Needed to Guide Investments in Collective Protection – 78

Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252

Developing Expertise at the Operational-Level of Warfare – 297

FORCENet Net Centric Architecture - A Standards View – 239

Hyperspectral Imagery: Warfighting Through a Different Set of Eyes – 280

Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260

Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308

Keeping an Operational Perspective in a Network-Centric World – 93

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297

Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7

Network Centric Warfare - Death or Renaissance of the Operational Art and the Operational Level of War – 241

Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation – 212

Operational Art for Space Control: Do the Principles of War Apply – 28

Optimizing Information Operations for the New Maritime Strategy – 303

Persistent ISR from UAVs: Doctrinal Considerations for Operational Warfare – 18

Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259

Space Power Integration: Perspectives from Space Weapons Officers – 27

- Sustained Space Superiority: A National Strategy for the USA – 27
- The Civil Reserve Air Fleet: A Vulnerable National Asset – 16
- The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil – 70
- Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157
- Urban Battlespace Control: A New Concept for Battle Command – 135
- War without Oil: A Catalyst for True Transformation – 136
- Whither Space Weapons: A Capability in Need of an Advocate – 26
- WARNING SYSTEMS**
- Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224
- Advanced Road Safety and Weather Warning System (ARSAWWS) – 153
- Airport Security System – 10
- WASPALOY**
- Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65
- WASTE DISPOSAL**
- Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 145
- Finding of No Significant Impact: Tennessee Valley Authority Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 143
- Selection of Corrosion Resistant Materials for Nuclear Waste Repositories – 59
- WASTE MANAGEMENT**
- Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report – 53
- WASTE TREATMENT**
- Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995 – 52
- WATER POLLUTION**
- Symposium on Bioremediation of Hazardous Wastes: Research, Development, and Field Evaluations. Held in Rye Brook, New York on August 8-10, 1995 – 52
- WATER VAPOR**
- Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- WATER**
- Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan – 152
- WAVE FRONTS**
- Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285
- Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- WAVE PROPAGATION**
- Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260
- XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- WAVE SCATTERING**
- High Energy Effective Action from Scattering of QCD Shock Waves – 269
- WAVEFORMS**
- Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105
- WAVEGUIDES**
- Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- Waveguide Apparatus and Method – 93
- WAVELENGTH DIVISION MULTIPLEXING**
- Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 103
- WEAPON SYSTEMS**
- Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124
- Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 13
- Directed Energy Weapons on the Battlefield: A New Vision for 2025 – 124
- PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – 246
- WEAPONS DEVELOPMENT**
- Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 14
- WEAPONS**
- Electromagnetic Pulse Threats in 2010 – 112
- Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons – 17
- WEAR TESTS**
- Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- WEAR**
- Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36
- WEATHER FORECASTING**
- Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134
- WEATHER**
- Owning the Weather in the Maritime Environment – 157
- WEIGHT REDUCTION**
- Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Premenopausal Women – 189
- WEIGHTLESSNESS SIMULATION**
- Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- WELDED JOINTS**
- Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64
- Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – 285
- Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43
- WETLANDS**
- Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – 294
- WETTABILITY**
- Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
- WHEELCHAIRS**
- Two-Speed Manual Wheelchair – 210
- WHEELS**
- Two-Speed Manual Wheelchair – 210
- WHITE NOISE**
- Noise Radar Technology Basics – 118
- WIDE AREA NETWORKS**
- Wide-Area Computing: Resource Sharing on a Large Scale – 235
- WILD 2 COMET**
- Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320

WILDLIFE

Treatment Wetland Habitat and Wildlife Use Assessment and North American Treatment Wetland Database Ver 2.0 (on CD-ROM) – [294](#)

WIND (METEOROLOGY)

Ocean Mixed Layer Response to Gap Wind Scenarios – [156](#)

Windstorm Impact Reduction Implementation Plan – [152](#)

WIND PROFILES

Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – [29](#)

WIND TURBINES

The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – [2](#)

WINGS

Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – [3](#)

Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – [114](#)

WIRELESS COMMUNICATION

A Performance Analysis of an Ad-hoc Ocean Sensor Network – [119](#)

Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – [88](#)

Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – [20](#)

'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – [34](#)

WIRE

Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – [99](#)

Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – [62](#)

WIRING

Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – [25](#)

WOOD

Durable Wood Composites for Naval Low-Rise Buildings – [49](#)

WORDS (LANGUAGE)

The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts) – [240](#)

WORKLOADS (PSYCHOPHYSIOLOGY)

Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – [209](#)

Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – [104](#)

Operator Site 2004-2005 (Operatoersplatsen 2004-2005) – [19](#)

Workload and Stress of Crews Operating Future Manned Vehicles – [229](#)

WORLD WIDE WEB

Accelerator Physics Code Web Repository – [268](#)

X RAY DIFFRACTION

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – [286](#)

X RAY FLUORESCENCE

Environmental Technology Verification Report: Field Portable X-ray Fluorescence Analyzer. Niton XL Spectrum Analyzer – [141](#)

X RAY LASERS

Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – [286](#)

Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics – [125](#)

X RAYS

Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – [130](#)

Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics – [125](#)

XENON

Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – [37](#)

Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – [36](#)

Personal Author Index

- Abatti, James M**
Small Power: The Role of Micro and Small UAVs in the Future – 10
- Abbas, Mian**
Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324
- Abbot, Jamie**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Abbott, R. P.**
Ion Deflection for Final Optics in Laser Inertial Fusion Power Plants – 285
- Abdelmessih, A. N.**
Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – 126
- Abercromby, Andrew**
Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 197
- Abou-Khousa, Mohamed A**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- Abro, A. M.**
Design and Analysis of Thermoplastic Composite Bridge Superstructures – 47
- Abubucker, C P**
Metrics for Uncertainty in Organizational Decision-Making – 247
- Abyzov, S. S.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Aceves, S. M.**
Fast Prediction of HCCi Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127
Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126
- Ackermann, M. R.**
Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313
- Ackroyd, Nathan C**
Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180
- Adam, J. D.**
Carbon Nanotube Resonator Transistor and Method of Making Same – 109
- Adam, James H., Jr.**
On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327
- Adams, David A.**
On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327
- Adams, Larry**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Adams, T. M.**
Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – 285
- Adamson, Brian**
AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223
- Adkins, Mark**
Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296
Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238
- Adler, Michael**
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167
- Agüero-Valverde, J.**
Advanced Road Safety and Weather Warning System (ARSAWWS) – 153
- Ahlberg, J.**
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- Ahmed, Norman O**
Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 9
- Ahn, Minsik**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Aindow, Mark**
Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65
- Akbar, A.**
Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 69
- Albery, William**
Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6
- Aleon, Jerome**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Alexander, James W.**
Electron-Induced Displacement Damage Effects in CCDs – 328
- Alexeeva, Irena**
Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181
- Alexopoulos, Aris**
Investigations into Novel Multi-Band Antenna Designs – 110
- Alfonsi, Lucilla**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Alford, J. M.**
Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73
- Al-Hamdan, Mohammad Z.**
Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137
- Alivisatos, A. P.**
Shaped Nanocrystal Particles and Methods for Working the Same – 39
- Allard, L.**
Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284
- Allen, C. C.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Allen, John G**
Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257
- Allen, M G**
Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – 139
- Allen, Mark G**
Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114
High Temperature Characterization of Ceramic Pressure Sensors – 120
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139

- Micro Magnetic Induction Machines for Portable Power Applications – 139
- Allen, P.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Allen, S. M.**
Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- Allgood, Daniel**
CFD Modeling Activities at the NASA Stennis Space Center – 113
- Allred, Clinton D**
Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183
- Alston, Anthony**
Experiments into the Operation and Effectiveness of Edge Organizations – 90
- Altobelli, N.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Alvidrez, Sonia**
Advanced Visualization for Operational Assessment (Briefing Charts) – 258
- Amankwah, Kofi**
Overuse Injury Assessment Model – 202
- Ambrosius, Stephen L**
Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299
- Ambrosone, Christine**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Amils, R.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Aminov, Benjamin**
Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248
- Anderson, James G.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Anderson, Martin**
The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137
- Anderson, M.**
Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Anderson, Yanhua Z.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Andrews, Rodney**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Angove, Michael D**
The Pentagon's New Map...to Oblivion: Why the USA Should Declare War on Oil – 70
- Angove, Michael**
Owning the Weather in the Maritime Environment – 157
- Antar, Yahia M**
Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- Antov-Bozalo, Danijela**
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- Antunano, Melchor J.**
Index of International Publications in Aerospace Medicine – 205
- Ao, Mingfang**
Role of TGF-beta in Prostate Cancer Progression – 171
- Apland, James P**
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167
- Araki, Tohru**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Aref, A. J.**
Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49
- Arepalli, Sivaram**
Nanomaterials Work at NASA-Johnson Space Center – 289
- Armato, S. G.**
Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images – 212
- Armstrong, J. W.**
Interiors of Enceladus and Rhea – 314
- Armstrong, William D**
Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3
- Arnald, David P**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
- Arnold, D P**
Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – 139
- Arnold, David P**
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
Micro Magnetic Induction Machines for Portable Power Applications – 139
- Arnold, K. F.**
Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43
- Arps, J.**
Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66
- Arumugan, M.**
81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138
- Arvidson, R. E.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Ashtijou, Mohammad**
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34
- Ashwin, P**
Workshop: Theory and Applications of Coupled Cell Networks – 256
- Asmar, S. W.**
Interiors of Enceladus and Rhea – 314
- Aubert, B.**
Observation of a Broad Structure at an Invariant Mass of 4.32 GeV in the Reaction $e+e- \rightarrow \pi+\pi-\pi(2S)$ Measured at BaBar – 275
- Auguston, Mikhail**
New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
- Auslender, Aaron H.**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- Austin, Brad L**
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75
- Ayazi, F.**
High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – 125

- Ayoub, A.**
Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1
- Babaimopoulos, A.**
Fast Prediction of HCCi Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127
- Bacic, Eugen**
MuVAL Extensions for Dynamic Asset Protection – 234
- Bacou, M.**
Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148
- Badakov, H.**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271
- Bahou, Wadie F**
Integrated Cancer Research in Five Thematic Areas of Interest – 176
- Bailey, Sheila**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Baird, Christopher**
Classification of Targets Using Optimized ISAR Euler Imagery – 74
Exploitation of ISAR Imagery in Euler Parameter Space – 74
- Bajagic, M.**
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- Bajcsy, Ruzena**
Computational Science: Ensuring America's Competitiveness – 217
- Bajt, Sasa**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Bajt, S.**
Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286
- Baker, Adam M**
A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24
- Baker, C.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Baker, M.**
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- Baker, Robert G**
Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255
- Bakker, Henry J.**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
- Balachandran, B**
Nonlinear Oscillations of Microscale Piezoelectric Resonators and Resonator Arrays – 105
- Balasubramanian, Kunjithapatham**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Balasubramanian, S. V.**
Compositions and Methods for Less Immunogenic Protein Formulations – 46
- Baldwin, K. M.**
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- Balisle, Christine W**
Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296
Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238
- Balitsky, I.**
High Energy Effective Action from Scattering of QCD Shock Waves – 269
- Balk, Steven P**
AR-NcoR Interaction as a Therapeutic Target for Prostate Cancer Prevention and Treatment – 180
- Ball, A. D.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
- Banerjee, P**
Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323
- Banerjee, S.**
Sidewall-Functionalized Carbon Nanotubes and Methods for making the Same – 66
- Banholzer, David D**
The Civil Reserve Air Fleet: A Vulnerable National Asset – 16
- Banks, H T**
Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260
- Baraban, Scott C**
A Morpholino Strategy to Assess TSC Gene Function in Zebrafish – 164
- Barate, R.**
Observation of a Broad Structure at an Invariant Mass of 4.32 GeV in the Reaction $e+e- \rightarrow \pi+\pi-\psi(2S)$ Measured at BaBar – 275
- Baratta, Giuseppe A.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Barcellos-Hoff, Mary H**
Bioavailability of TGF-Beta in Breast Cancer – 192
- Barmashenko, Boris**
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 123
- Barnard, Stephen T**
The Vision Problem: Exploiting Parallel Computation – 245
- Barnes, Christopher**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- Barnes, Laura E**
Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm – 208
- Barnes, Valerie B**
Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262
- Barnhart, David J**
A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24
- Baron, Fabien**
2006 Interferometry Imaging Beauty Contest – 118
- Barrett, B. R.**
From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275
- Barrett, Neil**
Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84
- Barrett, Rory**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Barty, A.**
Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286
- Basak, S.**
Light Baryon Spectrum using Improved Interpolating Operators – 270
- Bashkirov, V.**
Nanosimulator Based on Single Ion Detection – 265
- Basinger, Scott A.**
Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285
- Basset, R.**
Accelerator Physics Code Web Repository – 268

- Bastea, M.**
Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61
- Bastien, R.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Bastien, Ronald K.**
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Basu, Bamandas**
Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264
Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115
- Basun, S A**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- Basun, Sergei A**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
- Bates, Bevan D**
Investigations into Novel Multi-Band Antenna Designs – 110
- Baur, Carsten**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Bawendi, M. G.**
Method and System for Transferring a Patterned Material – 109
- Bayles, R.**
Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67
- Bayne, Jay**
C2 in the Joint Task Force (JTF) Enterprise – 91
- Bazan, Loreto Pazos**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Beautement, Patrick**
Experiments into the Operation and Effectiveness of Edge Organizations – 90
- Beck, B.**
Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266
- Beckel, Eric R**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Becker, Heidi N.**
Electron-Induced Displacement Damage Effects in CCDs – 328
- Becker, J.**
Vapor Deposition of Silicon Dioxide Nanolaminates – 38
- Becker, R.**
Plasticity Integration Algorithm Motivated by Analytical Integration of a Generalized Quadratic Function – 67
- Bedard, D**
Space-Based Observations of Satellites From the MOST Microsatellite – 25
- Bedrossian, Nazareth S.**
XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244
- Beeson, Harold**
Microgravity Effects on Combustion of Polymers – 69
- Beidleman, Neal**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Beiersdorfer, P.**
QED and Electron Collisions in the Super Strong Fields of K-shell Actinide Ions – 268
- Belarbi, A.**
Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1
- Belcher, J. W.**
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- Belenky, G**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Belhaj, M.**
Greenhouse Gas Emissions Trading for the Transport Sector – 148
- Belikov, Ruslan**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Belland, Kris M**
Aircrew Performance Cutting-Edge Technology: Emerging Human Performance Enhancement Technology Vision in Support of Operational Military Aviation Strategy – 124
- Bellodi, G.**
Accelerator Physics Code Web Repository – 268
- Belton, D**
Smoothed Particle Hydrodynamics: Applications Within DSTO – 116
- Beltz, Todd**
Organizational Change for Improved C2 in the Information Age – 84
- Benedetto, E.**
Accelerator Physics Code Web Repository – 268
- Benner, Lance A. M.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Benner, W. H.**
Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286
- Bennett, Thomas W.**
Design, Development & Flight Testing of The U.S. Army 4200 sq ft Parafoil Recovery System – 14
- Berger, G.**
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- Berger, J. M.**
High Throughput Screening of Crystallization of Materials – 44
- Berglund, Judith A.**
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134
- Berglund, Judith**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133
- Berkman, H T**
Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120
- Bernecky, W R**
Method for Real Time Matched Field Processing – 254
- Bernstein, L S**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Beroukhim, Rameen**
High-Resolution Mapping of Structural Mutations in Prostate Cancer with Single Nucleotide Polymorphism Arrays – 177
- Berrios, D.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Bertozzi, C. R.**
Chemoselective Ligation – 52
- Best, Christopher**
The Influence of Ship Deck-Edge Lighting on Perception of Position and Movement During Helicopter Recovery – 5
- Bevan, Matt**
Situation Awareness and Fatigue Sensing – 203
- Bevan, Matthew**
Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168

- Bevilacqua, Richard**
Developing a Viable Approach for Effective Tiered Systems – [262](#)
- Bevill, T. J.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – [320](#)
- Bhattacharyya, A.**
Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – [132](#)
- Bielecki, Daria**
Developing a Viable Approach for Effective Tiered Systems – [262](#)
- Bionta, R. M.**
Physics Analysis of a Gas Attenuator with Argon as a Working Gas – [269](#)
- Bisantz, Ann**
The Role of Meta-Information in C2 Decision-Support Systems – [298](#)
- Bischoff, Joyce**
Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – [188](#)
- Bish, D. L.**
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – [132](#)
- Bishop, G. A.**
On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – [147](#)
- Bishop, J.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – [151](#)
- Bivolaru, Daniel**
A Microwave-Augmented Plasma Torch Module – [287](#)
- Blackshire, James**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – [18](#)
- Blaettler, Daniel C**
Whither Space Weapons: A Capability in Need of an Advocate – [26](#)
- Blake, D.**
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – [132](#)
- Blankespoor, B.**
Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – [148](#)
- Blankson, Isaiah M.**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – [117](#)
- Blaske, Stephen F**
Workload and Stress of Crews Operating Future Manned Vehicles – [229](#)
- Blatt, Nicole**
The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts) – [240](#)
- Bloemhof, Eric E.**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – [118](#)
- Bloniski, Slawomir**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – [133](#)
- Boakye, Emmanuel E**
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Post-print) – [57](#)
- Bobin, N. E.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – [312](#)
- Boboltz, D A**
Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – [316](#)
- Boeuf, Jean-Pierre**
Microdischarge Sources of O₂(singlet Delta) – [288](#)
- Bogan, M. J.**
Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – [286](#)
- Bojanowski, Beth**
Towards an Integrated Deployment and Crisis Response Planning System for C2 – [299](#)
- Boka, Valerie**
A Mouse Model to Investigate the Role of DBC2 in Breast Cancer – [190](#)
- Bole, Bruce**
Finding the Right Measures of Effectiveness for Rebuilding the State of Iraq – [130](#)
- Bolender, Michael A**
Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – [3](#)
- Boller, Mike**
– [83](#)
- Bolotin, Gary S.**
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – [34](#)
- Bonaceto, Craig**
Structure Mapping in Visual Displays for Decision Support – [300](#)
- Bonanni, Pierino**
Fusing Competing Prediction Algorithms for Prognostics (Preprint) – [250](#)
- Booth, S. A.**
Nutritional Status Assessment (SMO 016E) – [203](#)
- Borak, Jordan**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – [133](#)
- Bordetsky, A.**
Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation – [212](#)
- Bordetsky, Alex**
Network on Target: Remotely Configured Adaptive Tactical Networks – [240](#)
- Borg, Janet**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – [317](#)
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – [149](#)
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – [317](#)
- Borg, J.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – [321](#)
- Boris, Jay**
Developing a Viable Approach for Effective Tiered Systems – [262](#)
- Borseth, Ann**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – [18](#)
- Bouchard, Alain**
Visible Battle Rhythm – [209](#)
- Bouhram, Mehdi**
Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – [264](#)
Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – [115](#)
- Bourakov, Eugene**
Network on Target: Remotely Configured Adaptive Tactical Networks – [240](#)
- Bourcier, W.**
Silica Extraction at the Mammoth Lakes Geothermal Site – [67](#)
- Boutwell, B. A. R.**
Thermal Barrier Coating – [68](#)
- Bouwman, B. M.**
Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – [160](#)
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – [199](#)

- Bouwman, B M**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202
- Bouwman, B. M.**
Sleep and Alertness Management – 200
- Bovbjerg, Dana H**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Bowden, David**
Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6
- Bowles, Jeff**
Developing a Viable Approach for Effective Tiered Systems – 262
- Bowman, Elizabeth K**
Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79
- Boyer, Cherrie B**
Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174
- Bracci, Andrea**
Intelligent Control Management of Autonomous Air Vehicles – 15
- Bradlyn, Andrew S**
Health-Related Quality of Life for Pediatric NF1 Patients – 171
- Brand, Steven**
A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 224
- Brandt, M.**
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- Brassfield, S. R.**
Triple Circuit Turbine Blade – 35
- Braunling, R. D.**
System and Method for Corrosion Maintenance Scheduling – 62
- Braunstein, M**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Breskin, A.**
Nanodosimeter Based on Single Ion Detection – 265
- Brezinsky, K.**
Very High Pressure Single Pulse Shock Tube Studies of Aromatic Species – 53
- Brickerhoff, Adam T.**
Solar Sail Model Validation from Echo Trajectories – 37
- Bridges, J. C.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Bridges, John**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Briles, S. D.**
Identification Coding Schemes for Modulated Reflectance Systems – 97
- Broadfoot, A L**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Bronder, T J**
A Quantitative Spectroscopic Comparison of Distant and Nearby Type Ia Supernovae: Tests for Homogeneity and Implications for Cosmology – 315
- Brooks, S.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Brophy, John**
Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36
- Brown, Andrew M.**
Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131
- Brown, C. G.**
Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154
- Lightning Protection System for HE Facilities at LLNL-Certification Template – 154
- Brown, C.**
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- Brown, D. A.**
Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266
- Brown, E. R.**
Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- Brown, Francis M**
The Evolution of Airpower Theory and Future Air Strategies for Employment in the Gap – 8
- Brown, G. E.**
Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report – 53
- Brown, G. M.**
Microcantilever Sensors for In-Situ Sub-surface Characterization. 2006 ERSD Annual Report – 53
- Brown, Jack**
Developing a Viable Approach for Effective Tiered Systems – 262
- Brown, Kevin**
Re-Architecting the DOD Acquisition Process: Transition to the Information Age – 259
- Brownlee, D.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Brownlee, Donald E.**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Brucato, John R.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Bruno, F.**
Enzymatic Template Polymerization – 40
- Bruton, C.**
Silica Extraction at the Mammoth Lakes Geothermal Site – 67
- Bryant, Russell E**
What Force and Metrics for What End - Characterizing the Future Leadership and Force – 83
- Bucey, William H**
Centralized Command and Control of Theater Missile Defense: The Joint Force Missile Defense Component Coordinator – 86
- Buchanan, K.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Buchanan, Tom**
Enabling Effective Decisions – 239
- Budunova, Irina V**
Constitutive Activation of NF-kappaB in Prostate Carcinoma Cells Through a Positive Feedback Loop: Implication of Inducible IKK-Related Kinase (IKKi) – 164
- Bugin, Marie**
Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181

- Bulovic, V.**
Method and System for Transferring a Patterned Material – 109
- Bunker, R. S.**
Thermal Shield Turbine Airfoil – 1
- Bunning, Timothy J**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Burchell, M. J.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Burchell, Mark J.**
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Burd, Michael L**
Global Warming and the Combatant Commander: Engaging the Arctic Region – 135
- Buretea, M. A.**
Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- Burger, M.**
Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61
- Burkhart, J.**
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- Burks, J.**
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308
- Burnet, C. S.**
Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 108
- Burns, Kevin J**
Analyzing Decisions and Characterizing Information in C2 Systems – 305
- Burns, Kevin**
Structure Mapping in Visual Displays for Decision Support – 300
- Burrell, A. K.**
Electrochromic Salts Solutions and Devices – 51
- Burrell, Craig**
Dynamic Defensive Posture for Computer Network Defence – 234
- Burton, N.**
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- Busch, M. W.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Busemann, Henner**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Busker, R. W.**
Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160
Sleep and Alertness Management – 200
- Butler, Deborah**
Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229
- Butterworth, Anna**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Byers, Jeff**
Developing a Viable Approach for Effective Tiered Systems – 262
- Byers, Rob**
Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84
- Cain, Don**
AOC Embedded Performance Measurement and Assessment – 228
- Caiozzo, V. J.**
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- Calaway, Michael J.**
Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327
- Callahan, P. S.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Cameron, Ivan L**
JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173
- Camilli, Marco**
Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – 208
- Campbell, D. E.**
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 39
- Campbell, Douglas**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Campbell, J C**
Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- Candra, Meirina**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
- Cardenas, F.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Carley, Kathleen M**
Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300
- Carlson, Eric**
Q5 Known Good Substrates – 103
- Carlsson, G.**
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- Carlton, Magdi**
Mars Reconnaissance Orbiter, Ground Data System, Receivables and Deliverables (REC/DELs) – 218
- Carne, Thomas G.**
The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2
- Carns, Jennifer L**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Carolia, R.**
Thermal Barrier Coating – 68
- Carr, Michael**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Carreno, Jose**
Maintaining Situational Awareness in Large, Complex Organizations – 297
- Carter, Campbell D**
A Microwave-Augmented Plasma Torch Module – 287
Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272

- Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Post-print) – 114
- Case, Jonathan L.**
Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- Castano, Rebecca**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Castner, William L.**
Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32
- Caughey, Byron**
High-Throughput Screening of Compounds for Anti-Transmissible Spongiform Encephalopathy Activity Using Cell-Culture and Cell-Free Models and Infected Animals – 179
- Ceruti, Marion G**
Sensor Ontology Integration for the Knowledge Management for Distributed-Tracking (KMDT) Program – 296
- Cetin, O**
Entropy Based Classifier Combination for Sentence Segmentation – 78
- Chait, Richard**
Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 13
- Chakroborty, Shyama**
Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – 28
- Chamberlain, Sam**
– 83
- Chambers Jr, Harold F**
Applying MHD Results to a Scramjet Vehicle – 287
- Champagne, N. J.**
Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – 99
- Chan, Heang-Ping**
Automated Method for Analysis of Mammographic Breast Density - A Technique for Breast Cancer Risk Estimation – 177
- Chan, K**
Innovative Methods for Engine Health Monitoring – 20
- Chang, C**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Chang, Y C**
Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- Chapman, H. N.**
Ultrafast Coherent Diffraction Imaging with X-ray Free-Electron Lasers – 286
- Charland, Shawn**
Trials Lessons Learned: DRDC Ottawa Propagation Measurements and Support for DLCSPM Trials 9-10 January 06 – 75
- Charles, Phil**
Assessing Self Organization and Emergence in C2 Processes – 307
- Chase, R M**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Chatterjee, Indira**
Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273
- Chau, Savio N.**
Catastrophic Fault Recovery with Self-Reconfigurable Chips – 215
- Chaudron, Laurent**
Metrics for Uncertainty in Organizational Decision-Making – 247
- Che, Mingxin**
A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187
- Chechik, R.**
Nanodosimeter Based on Single Ion Detection – 265
- Chen, C L**
Innovative Methods for Engine Health Monitoring – 20
- Chen, C.**
Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final – 288
- Chen, H.**
Phantom for Production of Controllable fMRI Signal – 97
- Chen, J. Y.**
Fast Prediction of HCCi Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127
- Chen, Long Y.**
Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129
- Chen, M.**
Waveguide Apparatus and Method – 93
- Chen, P. S. H.**
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
- Chen, Shaoyong**
Regulation of AR and (beta)-Catenin Signaling by Pin 1 in Prostate Cancer – 176
- Chen, Y.**
Double Hidden Flexure Microactuator for Phase Mirror Array – 98
- Cheng, Andrew F.**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Cheng, Andrew F.**
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Cheng, L. Y.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Chesneau, Olivier**
2006 Interferometry Imaging Beauty Contest – 118
- Cheung, Lai Y**
Leveraging C2IEDM for Enhancing Systems Interoperability – 151
- Chiang, Y. M.**
Electromechanical Actuators – 108
- Chidester, S. K.**
Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274
- Chien, Steve**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Chiewanichakorn, M.**
Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49
- Chin, S.**
Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site – 131
- Chin, Shiu-Kai**
Architectural Vulnerabilities of Third-Generation Portable Devices – 242
- Chinnaiyan, Arul M**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Chinniyan, A. M.**
Protein Microarray System – 46
- Chiu, J.**
US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126
- Chiu, S**
A Simulation Study of Multi-Channel RADARSAT-2 GMTI – 121
- Chiu, Y**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26

- The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Chiu, Yu-Hui**
Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56
- Chiu, Yu-hui**
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36
- Choate, B. J.**
Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- Choi, Yoon-Suk**
Modeling Plasticity of Ni₃Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- Choong, V. E.**
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- Chou, Hsin-Nan**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Chou, M. Y.**
Quantum Monte-Carlo Study of Electron Correlation in Heterostructure Quantum Dots. Final Technical Report – 102
- Chou, T. L.**
Purification of Carboxylic Acids by Complexation with Selective Solvents – 43
- Choulis, S. A.**
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- Chow, A. S.**
Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2
- Chow, C.**
Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- Chowdhury, Sudip**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Christe, Karl O**
High Energy Density Material Chemistry – 57
- Christensen, Andrew**
Heliophysics Science Enabled By the Return to the Moon – 325
- Christensen, Jon L**
Mapping the Future: Optimizing Joint Geospatial Engineering Support – 135
- Christensen, L.**
US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126
- Christie, Georgette**
The SWANSURF Wave Model Implementation and User Manual – 221
- Christie, James L**
Improving Joint Task Force Effectiveness by Creating a Joint Task Force Combat Analyst – 260
- Christie, Kevin A**
Synchronizing Chaos: Command and Control of Special Operations and Conventional Forces in Shared Battlespace – 80
- Chrysler, S. T.**
Traffic Engineering Applications of Driving Simulation – 211
- Chuang, C.**
Study of Aerosol/Cloud/Radiation Interactions over the ARM SGP Site – 131
- Chuang, Kathy C.**
Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- Chudnovsky, Y.**
Development and Field Trial of Dimpled-Tube Technology for Chemical Industry Process Heaters. Final Report – 267
- Chulaki, A.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Chung, Gilyong**
Q5 Known Good Substrates – 103
- Chung, Peter W**
An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290
- Chung, Seung**
Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220
- Ciany, G**
QACTIS Enhancements in TREC QA-2006 – 305
- Cichy, Ben**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Clague, D.**
Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 113
- Clancy, T. J.**
Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154
- Clark, B. C.**
Composition and Formation of the ‘Paso Robles’ Class Soils at Gusev Crater – 322
- Clark, Benton C.**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Clark, D. D.**
Identification Coding Schemes for Modulated Reflectance Systems – 97
- Clark, G. A.**
Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154
- Clark, III, C D**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
- Clarke, Robert**
Endocrine Therapy of Breast Cancer – 183
- Claussen, M**
Very Large Array Plus Pie Town Astrometry of 46 Radio Stars – 316
- Clayton, John D**
An Atomistic-to-Continuum Framework for Nonlinear Crystal Mechanics Based on Asymptotic Homogenization – 290
- Clements, John D**
Enhancing the Immune Response to Recombinant Plague Antigens – 195
- Clemett, Simon J.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Clenet, Michel**
Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- Coates, D. M.**
Identification Coding Schemes for Modulated Reflectance Systems – 97
- Coburn, S. P.**
Nutritional Status Assessment (SMO 016E) – 203
- Cody, George**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Coe-Sullivan, S.**
Method and System for Transferring a Patterned Material – 109
- Coffin, D. A.**
Methods for Wireless Mesh Multicasting – 214
- Cohen, David**
R.F Microphotonics for NASA Space Communications Applications – 31

- Cohen, R. H.**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- Colangeli, Luigi**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Cole, M. J.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
- Cole, Ray**
Developing a Viable Approach for Effective Tiered Systems – 262
- Coleman, Grace**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Colenzo, Steve P**
An Anticipatory Environment Framework – 301
- Collie, Nathan**
Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 193
- Collier, C.**
Update of the Non-State Trunk Inventory – 236
- Collins, Carl B**
Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105
- Colton, Richard**
Developing a Viable Approach for Effective Tiered Systems – 262
- Comarazamy, Daniel E.**
A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137
- Combs, Vaughn T**
Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230
- Compton, Dan**
A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2 – 301
- Comrie, Douglas C**
Geopolymers for Structural Ceramic Applications – 68
- Conkin, Johnny**
A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200
Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201
- Conklin, Johnny**
Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 197
- Conrad, Kendall**
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209
- Cook, Gary**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Cook, G**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- Cooke, Nancy J**
Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300
- Cooley, A.**
Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- Coombes, S**
Workshop: Theory and Applications of Coupled Cell Networks – 256
- Cooper, Bonnie L.**
Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter – 149
- Cooper, George**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Cooper, Owen R.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Covert, Michael D**
Modeling Performance in C4ISR Sustained Operations: A Multi-level Approach – 196
- Copeland, Robert**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Corbin, Brenda G**
LISA-The Library and Information Services in Astronomy Conferences – 315
- Corderman, R. R.**
Elongated Nano-Structures and Related Devices – 37
- Corera, Shehan A**
Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272
- Corley, Charles P**
Air Force Space Doctrine: Is It Ready for Weapons in Space? – 29
- Corpac, Peter S**
Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257
- Cort, Brian**
Visible Battle Rhythm – 209
- Cost, R S**
Support for Dynamic Collaborative Action Teams – 232
- Costa, Bruno**
High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263
- Costich, Oliver**
A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System – 292
- Cotae, P**
Innovative Methods for Engine Health Monitoring – 20
- Cotton, William D.**
2006 Interferometry Imaging Beauty Contest – 118
- Coulter, K.**
Cost Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen. Quarterly Technical Report for period September 9, 2003 through October 31, 2006 – 66
- Cowen, Michael B**
Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304
Quantification of Subjective Information Assessments in C2 Decision Option Selection – 262
- Cox-Ganser, J.**
Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods. Morbidity and Mortality Weekly Report, Vol. 55, No. RR-8, June 9, 2006 – 160
- Cravens, Robert**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Craviso, Gale L**
Exploring Non-Thermal Radiofrequency Bioeffects for Novel Military Applications – 273
- Crawford, E D**
Magnetic Resonance Spectroscopy (MRS) of Prostatic Fluids for Early Detection of Prostate Cancer – 165
- Crawford, G. E.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- Crisp, David**
The NASA Orbiting Carbon Observatory – 310

- The Orbiting Carbon Observatory: Mission Overview – 311
- Criss, Jim M.**
Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- Croft, W B**
Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks – 307
UMass at TREC 2006: Enterprise Track – 87
- Cropper, Kevin**
Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
Situation Awareness and Fatigue Sensing – 203
- Cros, Florent**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
Micro Magnetic Induction Machines for Portable Power Applications – 139
- Cross, Robert**
Common Cause Case Study: An Estimated Probability of Four Solid Rocket Booster Hold-Down Post Stud Hang-ups – 129
- Crues, Edwin Z.**
A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 232
- Cruise, James F.**
Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137
- Crusian, Brian**
Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204
- Cucinotta, Francis A.**
Chromosome Aberrations in Astronauts – 203
Space Environment (Natural and Induced) – 327
- Cumiford, Leslie D**
Situation Awareness for Cyber Defense – 301
- Curry, R D**
A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- Curtin, John P**
Development and Novel Uses of Antibodies in Epithelial Ovarian Cancer – 167
- Custy, John**
Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87
- Cutbirth, J M**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 114
- Cutler, R. A.**
Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Cutts, R**
QACTIS Enhancements in TREC QA-2006 – 305
- Cuzzi, J.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- D Evelyn, M. P.**
High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38
- Dabbish, Laura A**
Coordinating Initiation and Response in Computer-Mediated Communication – 240
- Dahlburg, Jill**
Developing a Viable Approach for Effective Tiered Systems – 262
- Dale, Markus E**
Support for Dynamic Collaborative Action Teams – 232
- Dalke, Scott**
Reconfiguring Logistics Command and Control for the 21st Century – 87
- Dambreville, Samuel**
Comparative Analysis of Kernel Methods for Statistical Shape Learning – 245
Particle Filtering With Dynamic Shape Priors – 251
Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246
- Damohapatra, Sudipta**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Daniels, D**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- Darden, C.**
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308
- Das, Sauparna**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Micro Magnetic Induction Machines for Portable Power Applications – 139
- Dasarathy, Balakrishnan**
The DARPA Adaptive and Reflective Middleware Systems (ARMS) Program, Phase II: Pervasive Instrumentation and Adaptation for Distributed Real-Time Embedded Systems – 221
- Daso, Endwell O.**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- Daube, Bruce C.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Davanloo, Farzin**
Low-Impedance Compact Modulators Capable of Generating Intense Ultra-fast Rising Nanosecond Waveforms – 105
- Davies, Ashley**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Davies, Paul B**
Optical Characterization of Micro Particles in Molecular Plasmas – 56
- Davis, Alan D**
Filtering and Trust as Tools for the Operational Commander in the Information Age – 304
- Davis, Bradley M**
Effects of Visual, Auditory, and Tactile Navigation Cues on Navigation Performance, Situation Awareness, and Mental Workload – 104
- Davis, Dawn M.**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
- Davis, Elizabeth**
In-Space Crew-Collaborative Task Scheduling – 248
- Davis, J. A.**
Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their and Influence on Reactive and Transport. 2006 ERSD Annual Report – 53
- Davis, Jeffrey R.**
Space Exploration: Challenges in Medicine, Research, and Ethics – 205
- Davis, K. E.**
Proceedings of the International Symposium on Advanced Radio Technologies. Held in Boulder, Colorado on February 26-28, 2007 – 77
- Dawes, J H**
Workshop: Theory and Applications of Coupled Cell Networks – 256
- Dawson, Ralph**
High Power Mid Wave Infrared Semiconductor Lasers – 124
- Day, Tim L**
Network Centric Warfare - Death or Renaissance of the Operational Art and the Operational Level of War – 241
- de Jong, J L**
Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice – 247

- De La Cruz, J. L.**
Method for Testing Properties of Corrosive Lubricants – 41
- Dean, David F**
Representing the Human Decision Maker in Combat Identification – 298
- Decker, Ryan K.**
Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29
- Dehghani, Navid**
A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219
- Deisseroth, Albert B**
Vectors for Treatment of Metastatic Breast Cancer – 184
- DeKoven, Elyon**
A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302
- Delaney, Luc D**
A First Report on Electromigration Studies at a Model Copper-Aluminum Railgun Contact – 264
- DeLaurentis, Daniel**
A Robust Scalable Transportation System Concept – 237
- DeMange, P.**
Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284
- DeMasters, Gerald**
Susceptibility to Radiation Induced Apoptosis and Senescence in p53 Wild Type and p53 Mutant Breast Tumor Cells – 193
- Demos, S. G.**
Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284
- Denaro, Tracy R**
Purification and Characterization of the Danaus Plexippus Cryptochromes – 173
- Denmeade, Samuel R**
Identification of Breast Cancer Specific Proteolytic Activities for Targeted Pro-drug Activation – 178
- Denning, Todd**
AOC Embedded Performance Measurement and Assessment – 228
- Derue, D S**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- Desouza, Kevin C**
Agile and Resilient Hierarchies for Defense Departments: Lofty Ideal or an Actionable Proposal – 302
- DeStefano, Chad C**
An Anticipatory Environment Framework – 301
- Dexter, Dan**
A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 232
- DeYoung, Russell J.**
Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122
- D'Hendecourt, Louis**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Di Nocera, Francesco**
Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – 208
- Diao, J.**
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- Dick, David**
National Command Capability (NCC): Design for a Collaboration Architecture – 243
- Dickinson, J C**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Dickover, Noel**
Human Interface to Netcentricity – 308
- Dickson, Robert B**
A Comprehensive Postdoctoral Training Program in Breast Cancer – 190
- Diedrich, A.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
- Diesner, Jana**
Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300
- Dietch, P. E.**
System and Method for Corrosion Maintenance Scheduling – 62
- Diggs, Donald**
C2 in the Joint Task Force (JTF) Enterprise – 91
- Dillon, H. E.**
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 146
- Dimeo, F.**
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
- Dimiduk, Dennis M**
Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- Dimpfl, W L**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Ding, X.**
Silver Crystals Through Tollen's Reaction – 44
- Dipper, Tamlan**
A System Shock Approach to Modelling Clandestine Network Disruption – 78
- DiVita, Joseph**
Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7
- Divsalar, Dariush**
Construction of Protograph LDPC Codes with Linear Minimum Distance – 218
- Diwadkar-Navsariwala, Veda**
Selenoproteins and Prostate Cancer – 170
- Djouadi, Zahia**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Djouadi, Z.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Do, Nhu-Nga T**
Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299
- Doczy, Erica J**
Human Neck Response during Vertical Impact with Variable Weighted Helmets – 201
- Dodd, Lorraine**
Experiments into the Operation and Effectiveness of Edge Organizations – 90
- Dodoukh, I.**
Method and System for Extensible Position Location – 214
- Doescher, Craig T**
Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259
- Doggett, Thomas**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Dolinar, Sam**
Construction of Protograph LDPC Codes with Linear Minimum Distance – 218
- Doman, David B**
Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 3

- Domchek, Susan M**
Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 175
- Don, Wai S**
High Order Hybrid Central - WENO Finite Difference Scheme for Conservation Laws – 263
- Donath, Nina**
User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – 230
- Dondo, Maxwell**
Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
- Dong, Yunhan**
Distribution of X-Band High Resolution and High Grazing Angle Sea Clutter – 136
- Dongarra, Jack**
Computational Science: Ensuring America's Competitiveness – 217
- Donnelly, Martin J**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low Aspect Ratio – 114
- Doody, D. F.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Doody, David**
Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220
- Dorda, U.**
Accelerator Physics Code Web Repository – 268
- Doty, K.**
Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- Dou, Q P**
Examination of Potential Anti-Tumor Activity of N-Thiolated b-Lactam Antibiotics in Nude Mice Bearing Human Breast Tumors – 194
- Dougan, A. D.**
Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation – 212
- Downard, Ian**
AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223
- Doyle, John C**
Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software – 164
H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257
- Dressler, Rainer A**
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75
- Dressler, R A**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Dressler, Rainer A**
Analysis of the Electro spray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Drury, Todd P**
Extraction and Rendering Techniques for Digital Charting Databases – 136
- Dubon, Lydia P.**
From Zero to Integration in Eight Months, the Dawn Ground Data System Engineering Challenge – 217
- Duckett, Colin S**
XIAP as a Molecular Target for Therapeutic Intervention in Prostate Cancer – 188
- Dudek, J.**
Exotic and Higher Spin Mesons in Charmonium – 271
- Duensing, G. R.**
Phantom for Production of Controllable FMRI Signal – 97
- Duffield, Bruce**
Exploration Life Support: ELS Functions and Materials Interfaces – 207
- Dufresne, E. R.**
Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283
- Dukemand, Greg**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Dukes, Allen W**
Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79
- Dumars, P.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Duncan, A. J.**
Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 63
- Duncan, Jeff**
Fidelity versus Cost and Its Effect on Modeling and Simulation – 227
- Dunn, III, Charles**
Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82
- Dunn, M. L.**
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- Dunyak, James**
Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- Durante, M.**
Chromosome Aberrations in Astronauts – 203
- Duriscoe, Dan M**
Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 150
- Duxbury, N. S.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Dworkin, Jason P.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Dwyer, Christopher**
Developing a Viable Approach for Effective Tiered Systems – 262
- Dybdal, R. B.**
Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107
- Eckhart, Curtis D**
Microlocalization and Quantitation of Risk Associated Elements in Gleason Graded Prostate Tissue – 175
- Edelstein, W. A.**
Phantom for Production of Controllable FMRI Signal – 97
- Edgington, S.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Edwards, R. G.**
Exotic and Higher Spin Mesons in Charmonium – 271
Light Baryon Spectrum using Improved Interpolating Operators – 270
Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270
- Edwards, R.**
Hadron Structure from Lattice QCD – 276
- Effros, M.**
Randomized Distributed Network Coding – 76
- Eiamsa-ard, Kunyayut**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130

- Einhorn, W. M.**
Method and System for Extensible Position Location – 214
- Ekblad, William J**
Strategic Communication and the Geographic Combatant Commanders: The Current State of Affairs – 92
- Ekiner, O. M.**
Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- Eklund, Neil**
Fusing Competing Prediction Algorithms for Prognostics (Preprint) – 250
- Elliott, H. A.**
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- Elliott, Linda R**
Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299

Modeling Performance in C4ISR Sustained Operations: A Mult-level Approach – 196
- Elliott, Tom**
Electron-Induced Displacement Damage Effects in CCDs – 328
- Elm, William C**
Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81
- Emedocias, S.**
Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- Engau, Alexander**
Generating Epsilon-Efficient Solutions in Multiobjective Programming – 250
- English, Brian A**
Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114
- English, J. M.**
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- English, Jennifer M**
High Temperature Characterization of Ceramic Pressure Sensors – 120
- English, Ryan A**
CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121
- Enlow, Jesse O**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Entin, Elliot E**
A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams – 255
- Eovito, Bryan A**
The Impact of Synchronous Text-Based Chat on Military Command and Control – 81
- Eplattenier, P. L.**
Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61
- Epperly, John M**
Transformation for Disaster Relief: Developing a Hastily Formed Network during Operation Vigilant Relief – 157
- Erickson, R.**
Gruppantenneteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Eriksson, G.**
Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88
- Eriksson, M. A.**
Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140
- Ermanoski, I.**
EUV Testing of Multilayer Mirrors: Critical Issues – 274
- Estes, Maury**
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
- Estes, Sue**
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
- Estevadeordal, Jordi**
Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 273
- Ethier, S. P.**
Protein Microarray System – 46
- Etien, R. A.**
Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52
- Evans, D R**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- Evans, Dean R**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57

Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Evans, Diane L.**
Multisensor Platform Deployment Proposal for International Polar Year (IPY) – 149
- Evans, J.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
- Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Ezekiel, Jonathan**
A Parallel Saturation Algorithm on Shared Memory Architectures – 236
- Fair, Geoff E**
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Postprint) – 57
- Farach-Carson, Mary C**
Function of Periecan Domain 1 in Prostate Cancer – 163
- Farah, J.**
Low Leakage Finger Seal – 44
- Farber, David**
Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216
- Farrey, G. W.**
Electromechanical Actuators – 108
- Fast, J. E.**
Comparison of LaBr3:CE and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- Fayer, Michael D**
Enhanced Vibrational Echo Correlation Spectrometer for the Study of Molecular Dynamics, Structures, and Analytical Applications – 106
- Feikema, D. A.**
Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73
- Feiveson, A. H.**
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
- Ferguson, Charles D**
Gauging U.S.-Indian Strategic Cooperation – 281
- Ferguson, Dale C.**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288

The NASA Space Environments and Effects Program (SEE): Over a Decade of Useful Products for Spacecraft Designers and Operators – 33
- Ferguson, Patrick**
Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299
- Fernandez, Adolfo J**
Military Role in Space Control: A Primer – 24
- Fernandez, Manuel A**
Computational Science: Ensuring America's Competitiveness – 217
- Fernandez-Remolar, D. C.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322

- Fernandez-Remolar, D.**
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Ferrari, Adam**
Wide-Area Computing: Resource Sharing on a Large Scale – 235
- Ferrari, C.**
Cassini CIRS Observations of Thermal Differences in Saturn’s Main Rings with Increasing Phase Angle – 313
- Ferrini, Gianluca**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Fey, A L**
Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – 316
- Fink, Patrick W.**
Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250
- Firschein, Oscar**
The Vision Problem: Exploiting Parallel Computation – 245
- Fischer, Eric A**
Creating a National Framework for Cybersecurity: An Analysis of Issues and Options – 296
- Fischer, Hannah**
U.S. Military and Iraqi Casualty Statistics: Additional Numbers and Explanations – 254
- Fischer, Nicholas O**
Nanoparticle-Mediated Rescue of p53 Through Targeted Degradation of MDM2 – 195
- Fischler, Martin A**
The Vision Problem: Exploiting Parallel Computation – 245
- Fitzgerald, Dennis**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Fix, D. V.**
Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64
- Flath, L. M.**
Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213
- Fleckenstein, Holger**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Fleege, E. J.**
Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153
- Fleming, G. T.**
Light Baryon Spectrum using Improved Interpolating Operators – 270
- Fleming, G.**
Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270
- Fleming, Robert A**
Improving Collaboration in Command and Control Environments: Creating and Exchanging Iconic Tags of Key Information – 304
- Quantification of Subjective Information Assessments in C2 Decision Option Selection – 262
- Fliller, R.**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
- Flo, Robert**
Transitioning Research Concepts to the Command and Control Community Quickly – 80
- Floss, C.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Floss, Christine**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – 149
- Flournoy, R D**
Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- Flowers, D. L.**
Fast Prediction of HCCi Combustion with an Artificial Neural Network Linked to a Fluid Mechanics Code – 127
- Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – 126
- Floyd, David**
Ad-Hoc Networks and the Mobile Application Security System (MASS) – 224
- Flynn, George J.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Folkman, Judah**
Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188
- Fonseca, Michael A**
High Temperature Characterization of Ceramic Pressure Sensors – 120
- Fontaine, M. D.**
Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 77
- Foreman, James D**
Predicting the Effects of Longitudinal Variables on Cost and Schedule Performance – 229
- Forman, L.**
Directional Detection of a Neutron Source – 277
- Forsyth, Brad**
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Forsythe, Steven L**
Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262
- Fouse, Adam**
The Role of Meta-Information in C2 Decision-Support Systems – 298
- Fox, Roy**
Design, Development & Flight Testing Of The U.S. Army 4200 sq ft Parafoil Recovery System – 14
- Frame, Edwin A**
Evaluations of QMI After-Market Additives – 7
- France, Derek C**
Keeping an Operational Perspective in a Network-Centric World – 93
- Franchi, Ian A.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Franchi, Ian**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Freebury, Gregg**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Freeman, Jared**
Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – 300
- Friedman, A.**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- Solving the Quasi-Static Field Model of the Pulse-Line Accelerator; Relationship to a Circuit Model – 267
- Friendlander, L. R.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- Fries, D.**
Silver Crystals Through Tollen’s Reaction – 44
- Fries, Mark**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Frisbie, Kevin R**
Integrated Battle Command Program: Decision Support Tools for Planning and Conducting Unified Action Campaigns in Complex Contingencies – 257

- Fritz, P**
 Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120
- Froh, Michael**
 MulVAL Extensions for Dynamic Asset Protection – 234
- FROM**
 A Parallel Saturation Algorithm on Shared Memory Architectures – 236
 Toward a Framework for Modeling Space Systems Architectures – 236
- Frommeyer, G.**
 Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- Froscher, Judith N**
 A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System – 292
- Fu, Lee-Lueng**
 Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159
- Fua, Pascal V**
 The Vision Problem: Exploiting Parallel Computation – 245
- Fuchs, A.**
 Nanostructured Magnetorheological Fluids and Gels – 39
- Fuerst, Steven V.**
 General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319
- Fujita, E. M.**
 Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – 39
- Fukuchi, M.**
 Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Fuller, Mark**
 Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166
- Fullerton, L. W.**
 Method and System for Extensible Position Location – 214
- Fung, J**
 Entropy Based Classifier Combination for Sentence Segmentation – 78
- Funke, Gregory J**
 Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79
- Fuqua, Suzanne A**
 Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – 167
- Gadiraju, Priya**
 Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114
- Gaeta, Geraldine**
 Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56
- Gainsforth, Zack**
 Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Galati, N.**
 Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47
- Galdorisi, George**
 Maintaining Situational Awareness in Large, Complex Organizations – 297
 Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297
- Gall, K.**
 Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- Gallagher, Hilary L**
 Human Neck Response during Vertical Impact with Variable Weighted Helmets – 201
- Gallagher, M.**
 Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153
- Galofaro, Joel T.**
 NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288
- Galpin, Tim**
 Enabling Effective Decisions – 239
- Galster, Scott M**
 Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79
- Gannon, James M**
 Operationalizing Defense Support to Public Diplomacy – 93
- Gao, Yi**
 Tissue Tracking: Applications for Brain MRI Classification – 281
- Gappinger, Robert O.**
 Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Garcia, Jessica**
 Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Garcia-Hernandez, Maria de la L**
 Development of STEAP-based Vaccines for the Treatment of Prostate Cancer – 192
- Gardner, J A**
 Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Garner, Charles**
 Comparison of NASA's 30-cm Ion Thruster Capabilities with the Dawn Mission Requirements – 36
- Garrity, Michael J**
 Developing Expertise at the Operational-Level of Warfare – 297
- Garstka, John**
 Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296
 Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238
- Garvey, Dave**
 A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2 – 301
- Gatesman, A J**
 Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Gaume, R A**
 Very Large Array Plus Pie Town Astrometry of 46 Radio Stars – 316
- Gautier, Jean**
 Tumor Suppression by BRCA-1: A Critical Role at DNA Replication Forks – 178
- Gazonas, George A**
 An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253
- Geiss, II, John P**
 Directed Energy Weapons on the Battlefield: A New Vision for 2025 – 124
- Gellert, R.**
 Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- George, Kerry A.**
 Chromosome Aberrations in Astronauts – 203
 Space Environment (Natural and Induced) – 327
- Gerbig, Cristoph**
 Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Gernhardt, M. L.**
 Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201

- Gernhardt, Michael I.**
Potential Fifty Percent Reduction in Saturation Diving Decompression Time Using a Combination of Intermittent Recompression and Exercise – 197
- Gerstenmaier, William H.**
The International Space Station: Stepping-stone to Exploration – 323
- Ghasr, M T**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Ghosh, Ritwik**
Stathmin: A 'Relay Protein' in the Development of Prostate Cancer and a Potential Target for Anticancer Therapy – 170
- Gibson, John**
A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 224
- Giddings, R. A.**
High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38
- Giger, Maryellen L**
Undergraduate Summer Training Program in Breast Cancer Imaging – 171
- Gildea, Kevin M**
Developing Expertise at the Operational-Level of Warfare – 297
- Giles, R H**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Giles, R**
Classification of Targets Using Optimized ISAR Euler Imagery – 74
Exploitation of ISAR Imagery in Euler Parameter Space – 74
- Gilles, Mary K.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Gillman, P. L.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- Gilmore, Duane A**
Intent Driven Adversarial Modeling – 261
- Gilmour, Duane A**
An Anticipatory Environment Framework – 301
Scenario Generation to Support Mission Planning – 226
- Giorgini, J. D.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Give'on, Amir**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Gizzi, Nick**
Dynamic Decision Support for Time Critical Targeting – 7
- Glaser, Robert J.**
Maximum von Mises Stress in the Loading Environment of Mass Acceleration Curve – 129
- Glavin, Daniel P.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Glezer, Ari**
Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114
- Glock, David P**
Support for Dynamic Collaborative Action Teams – 232
- Glover, Tiffany**
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
- Godbold, Jim**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Gode, J.**
Greenhouse Gas Emissions Trading for the Transport Sector – 148
- Goebel, Dan M.**
Analytical Ion Thruster Discharge Performance Model – 35
Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- Goebel, Kai**
Fusing Competing Prediction Algorithms for Prognostics (Preprint) – 250
- Gogineni, Sivaram**
Low-Speed Flow Control Using Dielectric Barrier Discharge (DBD) – 273
- Gokhale, Swapna S**
An Agent-Based Simulation Model for Organizational Analysis – 86
- Gold, Vladimir M**
Engineering Model for Design of Explosive Fragmentation Munitions – 222
- Goldberg, David E**
From Theory to Air Force Practice: Applications and Non-Binary Extensions of Probabilistic Model-Building Genetic Algorithms – 253
- Golden, D. C.**
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
- Gollahon, Lauren S**
Analysis of Breast Cell-Lineage Response Differences to Taxol Using a Novel Co-Culture System – 193
- Golubitsky, M**
Workshop: Theory and Applications of Coupled Cell Networks – 256
- Gomez, Trinidad,**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Gomez-Ortiz, D.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- Gonzalez, Jorge E.**
A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137
- Goodbody, Chris**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Goodfellow, Paul J**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Goodman, John L.**
Rendezvous and Proximity Operations of the Space Shuttle – 37
- Goodman, Leonard**
Identifying Potential Implications of Technologies on Military and Security Operations – 261
- Gordaninejad, F.**
Nanostructured Magnetorheological Fluids and Gels – 39
- Gordon, R. G.**
Vapor Depositon of Silicon Dioxide Nanolaminates – 38
- Gordon, S. R.**
Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52
- Gorlatova, Maria A**
Review of Existing Wormhole Attack Discovery Techniques – 235
- Gorman, M. D.**
Thermal Barrier Coating – 68
- Goshorn, Rebekah**
Maintaining Situational Awareness in Large, Complex Organizations – 297
Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 297
- Gouin, Denis**
Visible Battle Rhythm – 209
- Gounelle, Matthieu**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Gounelle, M.**
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150

- Gower, L. B.**
Fibrous Minerals Methods for Their Production Using a Solution-Precursor-Solid Mechanism and Methods and Use – 47
- Goyette, T M**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Graetzel, Michael**
Development of High Efficiency, Low-Cost, and Flexible Dye-Sensitized Solar Cells – 55
- Graff, T. G.**
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
- Graham, G. A.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Granot, J.**
Structure and Dynamics of GRB Jets – 317
- Grant, Matthew E**
Space Dependence - A Critical Vulnerability of the Net-Centric Operational Commander – 28
- Grant, Tim J**
Hybrid Metaheuristic Planning and Military Decision-Making: Commonalities between Theory and Practice – 247
- Grantham, S.**
EUV Testing of Multilayer Mirrors: Critical Issues – 274
- Greeley, Ron**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Green, S. F.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Greenberg, Edward**
Standardizing an End-to-end Accounting Service – 72
- Greene, Nathanael**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Gregori, Luisa L**
Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162
- Gregory, D. A.**
Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60
- Grendahl, Scott**
FPI and MPI of Cracks Under Coatings – 42
- Grier, D. G.**
Apparatus and Method for Fabrication Sorting and Integrating Materials with Holographic Optical Traps – 283
- Griffiths, Jose-Marie**
Computational Science: Ensuring America's Competitiveness – 217
- Grimes, Lorie**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
- Grimshaw, Andrew**
Wide-Area Computing: Resource Sharing on a Large Scale – 235
- Grippio, A.**
Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Grisogono, Anne-Marie**
The Implications of Complex Adaptive Systems Theory for C2 – 81
- Groen, B.**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199
- Groen, B**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202
- Groeschler, S**
Transportation Vibration Analysis of the XM982 Projectile – 278
- Grote, D. P.**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- Grothkopf, Uta**
LISA-The Library and Information Services in Astronomy Conferences – 315
- Grubbs, R. H.**
Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- Gruber, Mark R**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Post-print) – 114
- Gu, B.**
Microcantilever Sensors for In-Situ Subsurface Characterization. 2006 ERSD Annual Report – 53
- Gu, G.**
Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – 265
- Gualtieri, James W**
Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81
- Gueera, Alan**
External Cargo Integration Overview – 30
- Gupta, K**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Gutierrez, P.**
Silica Extraction at the Mammoth Lakes Geothermal Site – 67
- Gutmark, Ephraim**
Emissions Control in Swirl Stabilized Spray Combusters, an Experimental and Computational Study – 75
- Guzy, Lawrence**
Effects of Tactile and Audio Cues on Reducing Vestibular Illusions – 6
- Haddad, F.**
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- Hagan, Joel J**
Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3
- Hager, Carl H., Jr.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Haggod, N. W.**
Electromechanical Actuators – 108
- Haguenaer, Pierre**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Hahn, Andrew**
A Robust Scalable Transportation System Concept – 237
- Haines, S.**
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308
- Hainin, M. R.**
Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- Hakkani-Tur, D**
Entropy Based Classifier Combination for Sentence Segmentation – 78

- Hale, Christopher R**
Advanced Visualization for Operational Assessment (Briefing Charts) – 258
- Hall, John**
Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255
- Hall, Simmon J**
Construction of a Vesicular Stomatitis Virus Expressing Both a Fusogenic Glycoprotein and IL-12: A Novel Vector for Prostate Cancer Therapy – 163
- Hallmark, Dean S.**
Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 34
- Hambly, Nigel C**
Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – 315
- Hamilton, Scott**
Operational Thread Development: A Structured Approach to Capability Analysis – 225
- Hamm, Wesley**
Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259
- Hammond, T.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Hancock, K. L.**
Integrating Geospatial Technologies into the Right-of-Way Data-Management Process: Appendixes A through F – 293
- Handley, Anneliese**
Representing the Human Decision Maker in Combat Identification – 298
- Hansen, C. L.**
High Throughput Screening of Crystallization of Materials – 44
- Hansen, Charles**
Urban Battlespace Control: A New Concept for Battle Command – 135
- Hansen, H J**
Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- Hanson, John**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Hanson, Ronald K**
Emissions Control in Swirl-Stabilized Combustors – 125
- Harb, J. N.**
Microscopic Batteries for MEMS Systems – 97
- Hardee, Philip**
3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 117
A Magnetohydrodynamic Boost for Relativistic Jets – 116
- Hardisky, Benjamin**
FPI and MPI of Cracks Under Coatings – 42
- Hargrove, William W.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Harley, R. A.**
Analysis of Particulate Nitrate and Black Carbon Time Series – 142
- Harmon, J. K.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Harris, Carole V**
Health-Related Quality of Life for Pediatric NF1 Patients – 171
- Hartmann, dieter**
A Magnetohydrodynamic Boost for Relativistic Jets – 116
- Hartt, W. H.**
Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 69
- Harvey, John V**
Numerical Solution of the Extended Non-linear Schrodinger Equation – 286
- Harwick, Meredith J**
Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255
User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – 230
- Harwood, L.**
Upgrading the CEBAF Accelerator to 12 GeV – 289
- Hasan, David**
A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 232
- Hasse, D. J.**
Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- Hauck, Daryl J**
Pandora's Box Opened Wide: UAVs Carrying Genetic Weapons – 17
- Hausmann, D.**
Vapor Deposition of Silicon Dioxide Nanolaminates – 38
- Havens, J.**
LNG Safety Research: FEM3A Model Development – 146
- Haws, Gregory J**
Optimizing Information Operations for the New Maritime Strategy – 303
- Hay, Randall S**
Precipitation Coating of Monazite on Woven Ceramic Fibers: 1. Feasibility (Postprint) – 57
- Hayes, Christopher D**
Joint Helicopter Command: The 'Purple' Evolution of Rotary-Wing Aviation – 19
- Hayes, J**
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287
- Hayes, Richard E**
Battle of the Bulge: The Impact of Information Age Command and Control on Conflict – 82
- Hayes-Roth, Rick**
C2 Policy Panel: Under the Avalanche, Which Way Is Up? – 85
- Hays, Jim**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Hayward, J. K.**
High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69
- He, Yutao**
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34
- Heaton, Andrew F.**
Solar Sail Model Validation from Echo Trajectories – 37
- Heck, P. R.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Heer, M. A.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- Heer, M.**
Nutritional Status Assessment (SMO 016E) – 203
- Heger, A. J.**
Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109
- Heimann, Timothy**
International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- Heine, Thomas R**
Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56
- Heitmeyer, Constance**
Automatic Generation of State Invariants from Requirements Specifications – 216
- Hellinger, P.**
Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326
- Hemmati, Hamid**
Low-cost Large Aperture Telescopes for Optical Communications – 284
- Henderson, Glen**
MulVAL Extensions for Dynamic Asset Protection – 234

- Henry, Todd J**
Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – [315](#)
- Hensley, W. K.**
Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – [276](#)
- Hering, S. V.**
Analysis of Particulate Nitrate and Black Carbon Time Series – [142](#)
- Herrault, F**
Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – [139](#)
- Herren, K. A.**
Vacuum Strength of Two Candidate Glasses for a Space Observatory – [60](#)
- Herynk, Matthew H**
Prognostic Value of the K303R Estrogen Receptor Alpha Mutation in Breast Cancer – [167](#)
- Hesse, M.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – [233](#)
- Hessel, R. P.**
Gaseous Fuel Injection Modeling using a Gaseous Sphere Injection Methodology – [126](#)
- Heventhal, W. M., III**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – [77](#)
- Heventhal, William M., III**
Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – [220](#)
The Cassini-Huygens Sequence Development Process – [310](#)
- Hihn, Jairus M.**
Software Development Cost Estimation Executive Summary – [256](#)
- Hill, Ashley**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – [33](#)
- Hill, H. H.**
Ion Mobility Spectrometry Method and Apparatus – [266](#)
- Hill, S. B.**
EUV Testing of Multilayer Mirrors: Critical Issues – [274](#)
- Hill, Susan G**
Soldier Performance Issues in C2 'On the Move' – [88](#)
- Hillard, G. Barry**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – [288](#)
- Hillman, Jim**
Enabling Effective Decisions – [239](#)
- Hillman, Keithan**
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – [139](#)
- Hillman, Robert G**
Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – [230](#)
- Hine, A. A.**
Radar Images of Asteroid 100085 (1992 UY4) – [313](#)
- Hing, S.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – [197](#)
- Hinton, Anthony**
Nuclear Forensic Field Exercise 1 – [281](#)
- Hirsch, David**
Microgravity Effects on Combustion of Polymers – [69](#)
- Ho, T.**
Randomized Distributed Network Coding – [76](#)
- Hoffman, Forrest M.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – [133](#)
- Hoffman, J. J.**
Method for Making Sol Gel Spacers for Flat Panel Displays – [95](#)
- Hoffman, Karl-Heinz**
2006 Interferometry Imaging Beauty Contest – [118](#)
- Hoffmann, A.**
Pattern Transfer with Self-Similar Sacrificial Mask Layer and Vector Magnetic Field Sensor – [98](#)
- Holland, Donald E.**
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – [134](#)
- Hollenbeck, John R**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – [85](#)
- Hollis, R. A.**
Method of Making an Ion Transport Membrane Oxygen Separation Device – [60](#)
- Holloman, Kimberly**
Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – [296](#)
Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – [238](#)
- Holmgren, K.**
Greenhouse Gas Emissions Trading for the Transport Sector – [148](#)
- HonerzuBentrup, K.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – [197](#)
- Honeycutt, Kyle**
Analysis and Support Initiative for Structural Technology (ASIST) Delivery Order 0027-03: Crack Growth and Stress Intensity Prediction Techniques: External K-Solver--Demonstration – [16](#)
- Hook, Simon**
The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – [137](#)
- Hoon, Dave S**
Serum Genetic Markers as Surrogates of Prostate Cancer Progression – [165](#)
- Hoover, R. B.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – [312](#)
- Hoover, Richard B.**
Detecting Life and Biology-Related Parameters on Mars – [196](#)
- Hoppe, P.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – [321](#)
- Horenstein, M. N.**
Method for Linearizing Deflection of a MEMS Device Using Binary Electrodes and Voltage Modulation – [95](#)
- Horn, T.**
Experimental and Numerical Characterization of Transient Insertion of Heat Flux Gages in a Cylindrical Black Body Cavity at 1100 C – [126](#)
Precision Measurement of the Charged Pion Form and Factor – [276](#)
- Hornitschek, Michael J**
War without Oil: A Catalyst for True Transformation – [136](#)
- Horvath, Gregory A.**
Practical Application of Model-based Programming and State-based Architecture to Space Missions – [220](#)
- Horz, F.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – [320](#)
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – [320](#)
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – [321](#)
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – [320](#)

- Horz, Friedrich**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – 317
- Hossein-Zadeh, Mani**
R.F. Microphotonics for NASA Space Communications Applications – 31
- Hotz, Henry B.**
Integrated, Kerberized Login on MacOS X – 221
- Hou, Y**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Houchins, C**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Howard, Catherine**
An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
- Howard, Richard T.**
Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 34
- Howarth, M.**
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Howell, Leonard W., Jr.**
On the use of Lineal Energy Measurements to Estimate Linear Energy Transfer Spectra – 327
- Hrynyk, T.**
Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1
- Hsu, Kuang-Yu**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Post-print) – 114
- Hu, B.**
Nanostructured Magnetorheological Fluids and Gels – 39
- Hu, Q**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Hu, Z.**
Microcantilever Sensors for In-Situ Subsurface Characterization. 2006 ERSD Annual Report – 53
- Huang, Chung-Yung**
Targeting Mechanisms of Resistance to Taxane-Based Chemotherapy – 159
- Huang, Q.**
Hole Transport Layer Compositions and Related Diode Devices – 95
- Huang, Y**
Innovative Methods for Engine Health Monitoring – 20
- Huber, W. H.**
Elongated Nano-Structures and Related Devices – 37
- Hucka, Michael**
Enlightened Multiscale Simulation of Biochemical Networks. Core Theory, Validating Experiments, and Implementation in Open Software – 164
- Hudak, S**
Innovative Methods for Engine Health Monitoring – 20
- Hughes, Mark S.**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
- Hughes, Michael P**
Effective USAF Air Traffic Control to Support Proposed Phase IV Operations – 13
- Hughes, Steven**
Identifying Potential Implications of Technologies on Military and Security Operations – 261
- Hull, Andrew J**
Dynamic Response of an Insonified Sonar Window Interacting with a Tonpilz Transducer Array – 103
- Huls, Dale Thomas**
Implementation of Programmatic Quality and the Impact on Safety – 128
- Huls, Dale thomas**
Use of New Communication Technologies to Change NASA Safety Culture: Incorporating the Use of Blogs as a Fundamental Communications Tool – 11
- Humm, D.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Hummel, Christian A.**
2006 Interferometry Imaging Beauty Contest – 118
- Humphrey, Marty**
Wide-Area Computing: Resource Sharing on a Large Scale – 235
- Humphrey, Peter A**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Hunt, Andrew**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Hurley, G.**
Relationships of HMA (Hot Mix Asphalt) In-Place Air Voids, Lift Thickness, and Permeability. Volume Three – 39
- Huss, L.**
Gruppennteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Hutcheson, Patrick D**
Design, Modeling and Performance of a Split Path JP-10/Air Pulse Detonation Engine – 54
- Hutchings, K. N.**
Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Huth, J.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Hwang, Grace**
Transferring Insights from Complex Biological Systems to the Exploitation of Nettet Sensors in Command and Control Enterprises – 246
- Ibanez, John**
Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220
- Iess, L.**
Interiors of Enceladus and Rhea – 314
- Ilevbare, G. O.**
Electrochemical Behavior of Alloy 22 in Extreme Chloride and Nitrate Environments – 52
- Iigen, Daniel R**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- Illa-Bochaca, Irineu**
Bioavailability of TGF-Beta in Breast Cancer – 192
- Imaizumi, Mitsuru**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Ingham, Michel D.**
Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218
Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220
- Innocenti, Mario**
Intelligent Control Management of Autonomous Air Vehicles – 15
- Inouye, Alan S**
Computational Science: Ensuring America's Competitiveness – 217
- Iny, Mandy**
Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
Situation Awareness and Fatigue Sensing – 203
- Ireland, Michael**
2006 Interferometry Imaging Beauty Contest – 118

- Irwin, Daniel**
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
- Ishaque, Mashhood**
On Applying Point-Interval Logic to Criminal Forensics (Student Paper) – 264
- Ishii, H. A.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Issa, Jean-Pierre**
DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 180
- Ivanov, M. V.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Jaap, John**
In-Space Crew-Collaborative Task Scheduling – 248
- Jacobs, Jeremy B.**
Johnson Space Center Material Laboratory Reproduction and Failure Analysis of Cracked Orbiter Reaction Control System Niobium Thruster Injectors – 32
- Jain, Ameet**
Intra-Operative Dosimetry in Prostate Brachytherapy – 168
- Jain, Prem**
Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- James, George H., III**
The Development of Modal Testing Technology for Wind Turbines: A Historical Perspective – 2
Wireless Sensor Needs in the Space Shuttle and CEV Structures Communities – 20
- Jandorf, Lina**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Jao, J. S.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Japkowicz, Nathalie**
Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
- Jasinski, Michael**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133
- Jasperse, John R**
Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264
Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115
- Javidnia, Shahram**
The Cassini-Huygens Sequence Development Process – 310
- Jedlovec, G.**
The Transition of NASA EOS Datasets to WFO Operations: A Model for Future Technology Transfer – 308
- Jeffords, Ralph**
Automatic Generation of State Invariants from Requirements Specifications – 216
- Jelinek, Jaroslav**
DNA Methylation as an Epigenetic Factor in the Development and Progression of Polycythemia Vera – 180
- Jenkins, Phillip**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Jensen, Scott L.**
Design of Electrical Systems for Rocket Propulsion Test Facilities at the John C. Stennis Space Center – 100
- Jessup, Sturat D**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 114
- Jha, Animesh**
Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
- Jha, Sushant K**
Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64
- Jiang, Hao**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Jiang, J.**
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- Jiang, N.**
Solid State High Power Device and Method – 96
- Jo, Hyunil**
Synthesis of Taxol-Like Prostate Cancer Chemotherapeutic Agents – 187
- Joakim, D.**
Operator Site 2004-2005 (Operatorsplatsen 2004-2005) – 19
- John, E**
Innovative Methods for Engine Health Monitoring – 20
- Johnson, Brian J.**
Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – 204
- Johnson, C. A.**
Thermal Barrier Coating – 68
- Johnson, Chris R**
Computational Science: Ensuring America's Competitiveness – 217
- Johnson, Eric M**
Battle Command System Analysis Methodology in the Cross Command Collaborative Effort (3CE) Environment – 259
- Johnson, M.**
Silica Extraction at the Mammoth Lakes Geothermal Site – 67
- Johnson, Michael D**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- Johnson, Nicholas L.**
A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324
Improvements to NASA's Debris Assessment Software – 215
- Johnson-Pais, Teresa L**
Amplification of Type II Cadherins in Prostate Cancer – 161
- Johnston, K J**
Very Large Array Plus Pie Town Astrometry of 46 Radio Stars – 316
- Jonathan, B.**
Operator Site 2004-2005 (Operatorsplatsen 2004-2005) – 19
- Jones, Christopher**
Construction of Protograph LDPC Codes with Linear Minimum Distance – 218
- Jones, D A**
Smoothed Particle Hydrodynamics: Applications Within DSTO – 116
- Jones, J. A.**
Nutritional Status Assessment (SMO 016E) – 203
- Jongsma, M. J.**
Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199
- Jongsma, M J**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202
- Jongsma, M. J.**
Sleep and Alertness Management – 200
- Joo, K.**
Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS – 272

- Jordan, K.**
Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Joshi, Ravindra P**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
- Jost, Hans-Jurg**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Joswiak, D**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- Jovanis, P. P.**
Advanced Road Safety and Weather Warning System (ARSAWWS) – 153
- Judd, Kathleen**
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
- Juge, J.**
Light Baryon Spectrum using Improved Interpolating Operators – 270
- Jules, Kenol**
Summary of the Science performed on-board the International Space Station during Increments 12 and 13 – 309
- Julien, Howard L.**
Pyrovalve Blowby Tests – 128
- Jundt, Dustin**
Team Adaptation to Structural Misalignment: Determinants of Alternative Change Mechanisms – 85
- Jung, W.**
Conceptual Design and Experimental Investigation of Polymer Matrix Composite Infill Panels for Seismic Retrofitting – 49
- Juran, I.**
Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads – 49
- Jurgens, R. F.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Kad, B. K.**
Cross-Roll Flow Forming of ODS Alloy Heat Exchanger Tubes for Hoop Creep Enhancement. Quaterly Technical Progress Report July 1-September 30, 2006 – 60
- Kahandawala, Moshan S**
Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272
- Kain, Richard Y**
On Access Checking in Capability-Based Systems – 235
- Kalidindi, Surya R**
Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Kamel, M.**
Development of a Cummins Westport SI-EGR Natural Gas Engine at 0.2 g/bhp-hr. February 2, 2005-July 31, 2006 – 126
- Kanda, H.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Kang, Myong H**
A Practical Transaction Model and Untrusted Transaction Manager for a Multilevel-Secure Database System – 292
Data Dependence Analysis for an Untrusted Transaction Manager – 295
- Kaplan, Jeremy**
Net-Centric, Enterprise-Wide System-of-Systems Engineering and the Global Information Grid – 260
- Karabadzhak, George F**
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – 75
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. II. Collisional-Radiative Model – 36
- Karasz, Frank E**
Electro-Optical Properties of Polymer Blends: Lasing, Electroluminescence and Photophysics – 68
- Karger, D.**
Randomized Distributed Network Coding – 76
- Karpov, Igor**
XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244
- Kartz, M. W.**
Real-Time Geo-Registration of Imagery Using Cots Graphics Processors – 213
- Kasdin, Jeremy N.**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Kase, K. R.**
Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- Kashiwagi, T**
Effects of Finite Sample Width on Transition and Flame Spread in Microgravity – 70
- Kaspar, B.**
Neutralizing Carbonic Acid in Deep Carbonate Strata below the North Atlantic. Annual Technical Report – 146
- Kasper, J. C.**
Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- Kaste, Richard**
Urban Battlespace Control: A New Concept for Battle Command – 135
- Katkoori, Srinivas**
Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100
- Katti, R. R.**
Bias-Adjusted Magnetoresistive Devices for Magnetic Random Access Memory (MRAM) Applications – 94
Pseudo Tunnel Junction – 265
Separate Write and Read Access Architecture for a Magnetic Tunnel Junction – 94
Tunneling Anisotropic Magnetoresistive Device and Method of Operation – 94
- Katz, Arje**
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 123
- Katz, Ira**
Analytical Ion Thruster Discharge Performance Model – 35
- Katz, Warren**
Transitioning Research Concepts to the Command and Control Community Quickly – 80
- Katzenellenbogen, John A**
Cyclopentadienyl Rhenium (Technetium) Tricarbonyl Complexes Integrated in Estrogen Receptor Ligands for ER+ Tumor Imaging – 180
- Kaur, Ramneet**
Role of PAK6 in Prostate Cancer – 182
- Kavlicoglu, B.**
Nanostructured Magnetorheological Fluids and Gels – 39
- Kazz, Greg**
Standardizing an End-to-end Accounting Service – 72
- Keasley, A. T.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
- Keasley, A**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321

- Kebede, Abebe**
International Heliophysical Year SCINDA Workshop/Abstract – 319
- Keddy, Christopher P.**
Pyrovalve Blowby Tests – 128
- Kehret, D.**
Low Leakage Finger Seal – 44
- Kelly, Brian K.**
The International Space Station: Stepping-stone to Exploration – 323
- Kenney, J S**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Kenzakowski, Donald C.**
Progress Toward Improving Jet Noise Predictions in Hot Jets – 278
- Keogh, Craig**
An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
- Kernan, B. D.**
Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- Kersey, W T**
Classification of Targets Using Optimized ISAR Euler Imagery – 74
Exploitation of ISAR Imagery in Euler Parameter Space – 74
- Keymeulen, Didier**
Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100
- Khan, Osman**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Khaneja, Navin**
Intelligent Sensing and Probing with Applications to Protein NMR Spectroscopy and Laser Chemistry – 280
- Kharkovsky, S**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Khatipov, Sergey A**
Development of a Database on the Changes in the Optical Properties of Materials used on the External Surfaces of Spacecraft Under the Action of the Space Environment Factors – 318
- Khavaran, Abbas**
Progress Toward Improving Jet Noise Predictions in Hot Jets – 278
- Khayat, Michael A.**
Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – 250
- Kibel, Adam S**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Kilgore, Michael W**
Defining the Molecular Actions of Dietary Fatty Acids in Breast Cancer: Selective Modulation of Peroxisome Proliferator-Activated Receptor Gamma – 183
- Kim, Dongsu**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Kim, Myung-Hee Y.**
Space Environment (Natural and Induced) – 327
- Kim, T. H.**
Emissive Sensors and Devices Incorporating These Sensors – 96
- Kimmel, Roger L**
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287
- Kincaid, Randall**
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167
- King, K. J.**
Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 53
- King, Paul I**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114
- King, William P**
Feasibility Study of Nanoscale Semiconductor Manufacture Using Thermal Dip Pen Nanolithography – 42
- Kinsella, Mary**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Kipp, M**
U.S. Army Environmental Center. Fort Dix Community Relations Plan – 308
- Kirin, Steven**
Improving Platoon Leader Situation Awareness with Unmanned Sensor Technology – 79
- Kirk, Brnjamin, S.**
SUPG Finite Element Simulations of Compressible Flows – 112
- Kirk, Robert S**
Airport Improvement Program: Issues for Congress – 23
- Kirkland, R.**
High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69
- Kirschner, Karl N**
Development of a Computational Assay for the Estrogen Receptor – 179
- Kitmacher, Gary H.**
The International Space Station: Stepping-stone to Exploration – 323
- Kleck, J. H.**
Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- Kleinman, David L**
Model-Based Organization Analysis and Design for an ESG Organization – 258
- Kleinman, David**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
- Klingelhofer, G.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- Kloeppe, Kirk M**
Pesky Critters – 9
- Klug, Andrew J**
Global-Warming: A National Security Issue – 151
- Knabe, Frederick**
Wide-Area Computing: Resource Sharing on a Large Scale – 235
- Knapp, C.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
- Knapp, James R**
Specification for Visual Requirements of Work-Centered Software Systems – 223
- Knight, K.**
Integer Programming Decoder for Machine Translation – 261
- Knight, Michele**
A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238
- Knight, P. G.**
Advanced Road Safety and Weather Warning System (ARSAWWS) – 153
- Knight, R D**
An Operational Framework for Battle in Network Space – 24
- Knoedler, Andrew J**
Lowering the High Ground: Using Near-Space Vehicles for Persistent C3ISR – 9
- Knoll, K.**
US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126
- Knoop, Joseph A**
Interagency Cooperation, Is It Enough to Achieve Unity of Effort?: Command and Control Concepts for the Homeland Maritime Domain – 87

- Koetter, R.**
Randomized Distributed Network Coding – 76
- Kolb, V. M.**
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- Komornik, U.**
Behavior of Fiber-Reinforced Polymer Composite Piles under Vertical Loads – 49
- Konkar, A**
Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- Konstantinou, Nikolaos**
Ocean Mixed Layer Response to Gap Wind Scenarios – 156
- Kooistra, Scott**
Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58
- Koresko, Chris D.**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Korinko, P. S.**
Hydrogen Effects on Laser Engineered Net Shape (LENS) Repaired Weldments – 285
Optimization Study for Fill Stem Manufacturing and Pinch Weld Processing – 43
- Koscho, M. E.**
Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- Koser, Hur**
Micro Magnetic Induction Machines for Portable Power Applications – 139
- Kott, Alexander**
Collaborative Awareness: Experiments with Tools for Battle Command – 257
- Koudelka, Jr, Benjamin F**
Network-Enabled Precision Guided Munitions – 243
- Kouveliotou, Chryssa**
On the Prompt Gamma-ray Emission Properties of Short GRBs – 316
- Kouzes, R. T.**
Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- Kovar, R. F.**
No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 59
- Kraemer, K E**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- Kraus, B. D.**
Method for Making Sol Gel Spacers for Flat Panel Displays – 95
- Kraus, Stefan**
2006 Interferometry Imaging Beauty Contest – 118
- Krause, Lee S**
Intent Driven Adversarial Modeling – 261
Scenario Generation to Support Mission Planning – 226
- Krausman, Andrea S**
Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299
- Krauss, Sharon W**
Critical Importance of Protein 4.1 in Centrosome and Mitotic Spindle Aberrations in Breast Cancer Pathogenesis – 193
- Kreitinger, N**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- Krishna, Sanjay**
High Power Mid Wave Infrared Semiconductor Lasers – 124
- Krueger, Todd C**
Persistent ISR from UAVs: Doctrinal Considerations for Operational Warfare – 18
- Krummacker, B. C.**
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- Krupa, M.**
Automated Inspection and Processing System – 211
- Kruse, Jon**
Network Centric Operations (NCO) Case Study: Task Force 50 During Operation ENDURING FREEDOM – 296
Network Centric Operations (NCO) Case Study: U.S. Navy's Fifth Fleet Task Force 50 in Operation ENDURING FREEDOM – 238
- Krystkowiak, Eric A**
Director of Space Forces: Refocused for the Way Ahead – 26
- Kubarovsky, V.**
Search for Pentaquarks with CLAS – 272
- Kuciapinski, Kevin S**
Liquid Crystal on Silicon Non-Mechanical Steering of a Laser Vibrometer System – 58
- Kugler, Richard L**
Operation Anaconda in Afghanistan: A Case Study of Adaptation in Battle – 90
- Kuhnert, Andreas**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Kulkarni, S. S.**
Novel Method for Forming a Mixed Matrix Composite Membrane Using Washed Molecular Sieve Particles – 45
- Kullander, F.**
Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284
- Kumar, J.**
Enzymatic Template Polymerization – 40
- Kuo, S P**
A Microwave-Augmented Plasma Torch Module – 287
- Kuykendall, W. K.**
Update of the Non-State Trunk Inventory – 236
- Kuznetsova, M.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Kyprianou, Ross**
Investigations into Novel Multi-Band Antenna Designs – 110
- LaCasse, Katherine M.**
Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- Lacey, P. I.**
Method for Testing Properties of Corrosive Lubricants – 41
- LaFollette, R. M.**
Microscopic Batteries for MEMS Systems – 97
- Lagally, M. G.**
Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140
- Lake, Mark S**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Lam, P. S.**
Mechanical Testing of Carbon Steel in High Pressure Hydrogen, Technical Report – 63
- Landsberger, S.**
81.114- University Reactor Infrastructure and Education Support/Prompt Gamma-ray Activation Analysis of Lithium Ion Battery Cathodes – 138
- Landwehr, Carl E**
How Far Can You Trust A Computer? – 235
On Access Checking in Capability-Based Systems – 235
- Lang, J. T.**
Low-Drag Hydrodynamic Surfaces – 115

- Lang, Jeffrey H**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – 56
Micro Magnetic Induction Machines for Portable Power Applications – 139
- Lang, T. G.**
Low-Drag Hydrodynamic Surfaces – 115
- Lange, Douglas S**
Command World – 80
PAL Boot Camp: Acquiring, Training, and Deploying Systems with Learning Technology – 246
- Lapenta, William M.**
Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- Laren, James M**
Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64
- Lars, E.**
Operator Site 2004-2005 (Operators-platsen 2004-2005) – 19
- Larsen, Axel M.**
International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- Larsen, Barbara S.**
Built But Not Used, Needed But Not Built: Ground System Guidance Based On Cassini-Huygens Experience – 219
- Larsson, Carey L**
Nuclear Forensic Field Exercise 1 – 281
- Latchford, Stephen**
Strategies for Defeating Commercial Imagery Systems – 27
- Lau, Yun-Tung**
Executable Architectures for Modeling Command and Control Processes – 241
- Laubach, Sharon**
From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311
- Laurini, Kathy**
International Multidisciplinary Artificial Gravity (IMAG) Project – 199
- Laverty, Richard R**
An Improvement to the Fourier Series Method for Inversion of Laplace Transforms Applied to Elastic and Viscoelastic Waves – 253
- Lawless, W F**
Metrics for Uncertainty in Organizational Decision-Making – 247
- Laws, Kenneth I**
Coarse Coding for Material and Object Identification – 245
- Lawson, Peter R.**
2006 Interferometry Imaging Beauty Contest – 118
- Lazarus, A. J.**
Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326
- Leach, Richard**
Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29
- LeBlanc, A.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- Leclerc, Yvan**
The Vision Problem: Exploiting Parallel Computation – 245
- LeCroy, Jerry E.**
Effects of Optical Artifacts in a Laser-Based Spacecraft Navigation Sensor – 34
- Lee, Adrienne Y**
Exploring the Relationship Between Distributed Training, Integrated Learning Environments, and Immersive Training Environments – 247
- Lee, Anthony**
Variable Resolution Direction Finding Using the Robust Symmetrical Number System – 104
- Lee, C. P.**
Thermal Shield Turbine Airfoil – 1
Triple Circuit Turbine Blade – 35
- Lee, Chung**
Immune Cells, if Rendered Insensitive to Transforming Growth Factorbeta, Can Cure Prostate Cancer – 195
Preparation for a Clinical Trial Using Adoptive Transfer of Tumor-Reactive TGF_β-Insensitive CD8⁺ T Cells for Treatment of Prostate Cancer – 190
- Lee, David**
Array of Laminated Waveguides for Implementation in LTCC Technology – 110
- Lee, Elizabeth**
Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- Lee, J. U.**
Elongated Nano-Structures and Related Devices – 37
- Lee, J**
Transportation Vibration Analysis of the XM982 Projectile – 278
- Lee, Jonathan A.**
Strengthening Aluminum Alloys for High Temperature Applications Using Nanoparticles of Al₂O₃ and Al₃-X Compounds (X= Ti, V, Zr) – 66
- Lee, R. S.**
One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268
- Lee, Richard**
R.F Microphotonics for NASA Space Communications Applications – 31
- Lee, S.**
The Artificial Gravity Bed Rest Pilot Project: Effects on Knee Extensor and Plantar Flexor Muscle Groups – 198
- Lefebvre, Julie**
Dynamic Defensive Posture for Computer Network Defence – 234
- Lefrancois, A.**
Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61
One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268
- Lehman, Lynn A**
Intent Driven Adversarial Modeling – 261
Scenario Generation to Support Mission Planning – 226
- Lehrer, J. A.**
Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148
- Lemieux, E. J.**
Automated Inspection and Processing System – 211
- Lenahan, Jack**
Agile Assessment Techniques for Evaluating Mission Capability Portfolio Ensembles in Complex Adaptive Architectures – 234
Assessing Self Organization and Emergence in C2 Processes – 307
- Leonard, John J**
Cooperative Autonomous Mobile Robots – 228
- Leone, Stephen R**
Ultrafast Soft X-Ray Probing of Core Level Molecular Dynamics – 125
- Leong, Chris**
Software Defined Radio Design for An IEEE 802.11a Transceiver using Open Source Software Communications Architecture (SCA) Implementation::Embedded (OSSIE) – 221
- Leonhard, Bob**
Enabling Effective Decisions – 239
- Lerch, Bradley A.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Leroux, H.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321

- Lescinski, Jamie**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Lester, Marsha I**
Quenching Dynamics of Electronically Excited Hydroxyl Radicals – 55
- Lesuer, D.**
c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61
Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- Levandier, D J**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Levandier, Dale J**
Analysis of the Electrospray Plume from the EMI-Im Propellant Externally Wetted on a Tungsten Needle – 56
- Levatin, J. L.**
MOSSFRAC: An Anisotropic 3D Fracture Model – 42
- Levchuk, Georgiy M**
PERSUADE: Modeling Framework for the Design of Modular Army Organizations – 224
- Levchuk, Georgiy**
An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 301
- Levchuk, Yuri**
PERSUADE: Modeling Framework for the Design of Modular Army Organizations – 224
- Levi, A. F. J.**
R.F Microphotonics for NASA Space Communications Applications – 31
- Levin, Gilbet V.**
Detecting Life and Biology-Related Parameters on Mars – 196
- Levis, Alexander H**
On Applying Point-Interval Logic to Criminal Forensics (Student Paper) – 264
- Levitt, Raymond E**
Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – 306
- Lewandowski, Edward J.**
Control of Dual-Opposed Stirling Converters with Active Power Factor Correction Controllers – 100
- Lewis, Elliot T,**
Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 21
- Lewis, Laird-Phillip R**
Rapid Motion Planning and Autonomous Obstacle Avoidance for Unmanned Vehicles – 14
- Lewis Miller, Nita**
A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209
- Lewis, N. S.**
Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- Li, A**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- Li, L.**
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- Libberton, Kerry**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Lich, Jason E**
Executable Architectures for Modeling Command and Control Processes – 241
- Lichti, A.**
Light Baryon Spectrum using Improved Interpolating Operators – 270
- Lichtner, P. C.**
Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their Influence on Reactive and Transport. 2006 ERSD Annual Report – 53
- Lighty, Roger A.**
A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219
- Lim, Kwang Y**
A Performance Analysis of an Ad-hoc Ocean Sensor Network – 119
- Lim, Seng C**
Computational Investigation of Flapping-Wing Propulsion for a Micro-Air Vehicle – 2
- Lin, H. W.**
Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 271
- Lin, X.**
Methods for Production of Recombinant Vascular Endothelial Cell Growth Inhibitor – 46
- Lin, Y.**
Carbon Nanotube Nanoelectrode Arrays – 110
- Lin, Zi-Wei**
Determination of Important Nuclear Fragmentation Processes for Human Space Radiation Protection – 328
- Lindberg, William R**
Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3
- Linderman, Richard**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Lindop, R**
Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- Linegang, Michael**
An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 301
- Ling, Hao**
Low-Cost Radar Sensors for Personnel Detection and Tracking in Urban Areas – 120
- Liou, F W**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Liou, J. C.**
A Sensitivity Study on the Effectiveness of Active Debris Removal in LEO – 324
- Lissaur, Jack L.**
The Birth of Planetary Systems – 309
- Lisse, C M**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- Little, David**
Air War Beyond the First Island Chain: Implications of China's Military Modernization for U.S. Maritime Strategy – 16
- Liu, Chen**
CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121
- Liu, G.**
Carbon Nanotube Nanoelectrode Arrays – 110
- Liu, J. C.**
Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- Liu, Qiang**
Modeling Intelligent C2 Using Technology of Multi-Agent – 83
- Liu, Yang**
Comparing Evaluation Metrics for Sentence Boundary Detection – 74
- Liu, Y.**
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- Llinas, James**
The Role of Meta-Information in C2 Decision-Support Systems – 298
- Loboda, Mark**
Q5 Known Good Substrates – 103
- Lodder, Robert**
Detecting Life and Biology-Related Parameters on Mars – 196

- Loebsved, E.**
Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88
- Loewenstein, Max**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Logan, R. W.**
Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274
- Loh, Kuan C**
Simulation and Performance Analysis of Routing in SONET/SDH Data Communications Network (DCN) – 237
- Lok-Kwong, Yan**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Lone, Lars O**
Airborne Hyperspectral and Satellite Multispectral Imagery of the Mississippi Gulf Coast Region – 285
- Long, Duncan**
Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 13
- Long, Jennifer H.**
The Cassini-Huygens Sequence Development Process – 310
- Looney, John P**
Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252
- Lopez, Jimena P.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Loreaux, Richard H**
Advanced Visualization for Operational Assessment (Briefing Charts) – 258
- Lorentzen, Justin**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Lorenz, A. M.**
Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- Loum, K.**
Method and System for Extensible Position Location – 214
- Lousine, M. J.**
Location Based Services for Integrated Cellular and LAN Networks – 214
- Love, J. J.**
National Geomagnetism Program: Current Status and Five-Year Plan, 2006-2010 – 132
- Lovell, Stacy**
An Agent-based Approach to Evaluating the Impact of Technologies on C2 – 301
- Lowe, Michele**
Imaging of 3.4 THz Quantum Cascade Laser Beam Using an Uncooled Microbolometer Camera – 123
- Lu, F.**
Carbon Nanotube Nanoelectrode Arrays – 110
- Lu, Wei-Min**
H(infinity) Control of Nonlinear Systems: A Class of Controllers – 257
- Lubaroff, David**
Vaccine Immunotherapy for Prostate Cancer – 161
- Lubman, D. M.**
Protein Microarray System – 46
- Lucatorto, T. B.**
EUV Testing of Multilayer Mirrors: Critical Issues – 274
- Lucek, J. W.**
High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38
- Luginbuhl, Christian B**
Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 150
- Luke, N S**
Viscoelasticity in Polymers: Phenomenological to Molecular Mathematical Modeling – 260
- Lund, Eric J**
Gyrotropic Guiding-Center Fluid Theory for the Turbulent Heating of Magnetospheric Ions in Downward Birkeland Current Regions – 264

Gyrotropic Guiding-Center Fluid Theory for Turbulent Inhomogeneous Magnetized Plasma – 115
- Lundborg, B.**
Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88
- Lundquist, Julie**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133
- Lunine, J. I.**
Interiors of Enceladus and Rhea – 314
- Lupton, J.**
Nutritional Status Assessment (SMO 016E) – 203
- Luryi, S**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Lutomski, Mike**
Bridging the Divide between Safety and Risk Management for your Project or Program – 292
- Luvall, Jeff**
A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137
- Luvall, Jeffrey C.**
The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137
- Lyons, Peter H**
National Command Capability (NCC): Design for a Collaboration Architecture – 243
- Lyons, John W**
Critical Technology Events in the Development of Selected Army Weapons Systems: A Summary of Project Hindsight Revisited – 13
- Ma, Z.**
Solid State High Power Device and Method – 96
- Macatangay, Ariel**
Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324
- Macfarlane, Steele**
The Command and Control Joint Integrating Concept (C2 JIC) ‘Spreading the Word’ (Briefing Charts) – 240
- MacIntyre, M**
An Operational Framework for Battle in Network Space – 24
- Macker, Joe**
AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223
- MacKinnon, Douglas J**
Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – 306
- MacMahon, H.**
Automated Method and System for the Evaluation of Disease and Registration Accuracy in the Subtraction of Temporally Sequential Medical Images – 212
- Macneice, P.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- MacNeill, Kevin**
2nd ISS Treadmill Development ‘T2 Project’ – 207
- Maddox, M.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Madhukar, A**
Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- Madni, Azad M**
The Role of Ontology in System-of-Systems Acquisition – 300

- Maggi, Jr, Leonard B**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Magimai-Doss, M**
Entropy Based Classifier Combination for Sentence Segmentation – 78
- Magri, C.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Mahoney, Michael J.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Mahoney, My G**
Molecular Characterization of Squamous Cell Carcinomas From Recessive Dys-trophic Epidermolysis Bullosa – 194
- Majstorovic, D**
Collision Avoidance W-Band FMCW Radars in an Altimeter Application – 22
- Malamas, Sitthichai**
Spectroscopic Imaging with an Uncooled Microbolometer Infrared Camera and Step-Scan FTIR – 279
- Malany, Lee**
Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – 28
- Malatesta, Daniel P**
Africa Command: An Interagency Solution and SOF's Role – 138
- Maldague, Pierre**
Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32
- Malmqvist, R.**
Gruppantenneteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Manasreh, Omar**
Optical Properties of III-V Semiconductor Nanostructures and Quantum Wells – 104
- Mani, V.**
Elongated Nano-Structures and Related Devices – 37
- Mann, Gottfried J**
Remarks on the New 100-200 Mhz Receiver of the Solar Radio Observatory of the AIP at Trens-dorf Near Potsdam, Germany – 318
- Manna, L.**
Shaped Nanocrystal Particles and Methods for Working the Same – 39
- Manning, T. a.**
Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60
- Mao, X. S.**
Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- Marcia, Joel**
Compact Ozone Lidar for Atmospheric Ozone and Aerosol Measurements – 122
- Marciano, W. J.**
Intense Neutrino Beams and Leptonic CP Violation – 291
- Marcus, M. S.**
Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140
- Mardis, Oscar**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Margot, J. -L.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Marhas, K.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Marin, E. B.**
Formulation of a Crystal Plasticity Model – 63
- Maris, H**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Markovic, Ana**
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- Marks, T. J.**
Hole Transport Layer Compositions and Related Diode Devices – 95
- Marselus, John E**
Who Pushes the Pickle Button – 8
- Martin, Oliver**
Practical Application of Model-based Programming and State-based Architecture to Space Missions – 220
- Martin, S. I.**
Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 53
- Martinez, Carlos E**
A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225
- Martinez, Charlie**
Thin Thread Analysis – 258
- Martovetsky, N. N.**
Development of the Butt Joint for the ITER Central Solenoid – 274
- Marzwell, Neville I.**
Catastrophic Fault Recovery with Self-Reconfigurable Chips – 215
- Mason, Brian D**
Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – 315
- Mason, G. R.**
Miniature Arcs for Synthesis of Carbon Nanotubes in Microgravity – 73
- Mason, Georgia**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Mason, Keith**
An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
- Mason, Peter**
Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
- Mathai, M.**
Novel Method to Generate High Efficient Devices Which Emit High Quality Light for Illumination – 107
- Mathews, Robert**
Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Mathieu, Jennifer**
Transferring Insights from Complex Biological Systems to the Exploitation of Netted Sensors in Command and Control Enterprises – 246
- Mathur, N.**
Exotic and Higher Spin Mesons in Charmonium – 271
- Mathys, Gary**
Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Matsakis, D**
Time Transfer Through GPS, and the Harmonization of GPS, GLONASS and Galileo for Timing – 323
- Matsuzawa, Shu-ichi**
The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor Signaling – 170
- Matzke, Martha K**
Computational Science: Ensuring America's Competitiveness – 217
- Maulik, R. J.**
Means and Method for a Liquid Metal Evaporation Source With Integral Level Sensor and External Reservoir – 277
- Mayer, Bruce J**
Probing the Tyrosine Phosphorylation State in Breast Cancer by Src Homology 2 Domain Binding – 181
- Mayfield, James**
Support for Dynamic Collaborative Action Teams – 232
- Mayfield, J**
QACTIS Enhancements in TREC QA-2006 – 305
- Mayk, Israel**
The Role of Ontology in System-of-Systems Acquisition – 300

- Mazarakis, M. G.**
Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System – 276
- Mazzoni, Dominic**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- McBride, K.**
Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 113
- McCartney, Michael**
An Operational Commander's Guide to the Media – 91
- McClesky, T. M.**
Electrochromic Salts Solutions and Devices – 51
- McCorkle, Linda S.**
Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- McCoy, T. J.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- McCubbin, D.**
Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148
- McDonald, Armando**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- McDonnell, John**
Dynamic Decision Support for Time Critical Targeting – 7
- McDowell, D. L.**
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- McGovern, Margaret**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- McGrath, Shaun R**
Leveraging Simulation Against the F-16 Flying Training Gap – 8
- McGraw, Daniel**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- McGraw, J. T.**
Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – 313
- McGreevy, Paul**
Aligning Net-Centric Practice with Net-Centric Technology: A Way Forward – 84
- McGuckin, T.**
Advantages of the Program-Based Logbook Submission GUI at Jefferson Lab – 271
- Calculation of the nucleon axial charge in lattice QCD – 270
- McInroy, John E**
Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3
- McKeel, Ryan W**
Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230
- McKeever, William E**
An Anticipatory Environment Framework – 301
Scenario Generation to Support Mission Planning – 226
- McKellip, Rodney D.**
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134
- McKellip, Rodney**
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133
- McKernan, M. A.**
Physics Analysis of a Gas Attenuator with Argon as a Working Gas – 269
- McKneely, Jennifer**
Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
Situation Awareness and Fatigue Sensing – 203
- McLean, John**
Proving Noninterference and Functional Correctness Using Traces – 222
- McNabb, D. P.**
Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266
T-REX Design Considerations for Detection of Concealed 238U – 268
- McNally, D. E.**
Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- McNamara, K. M.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- McNamee, P**
QACTIS Enhancements in TREC QA-2006 – 305
- McTaggart, Kevin**
Simulation of Hydrodynamic Forces and Motions for a Freely Maneuvering Ship in a Seaway – 232
- McVeigh, Bruce W**
A Joint Medical Command --- Is It Needed to Enhance Medical Interoperability in the Modern Warfight – 192
- Meadows, Catherine A**
The NRL Protocol Analyzer: An Overview – 245
- Meadows, Catherine**
A Logical Language for Specifying Cryptographic Protocol Requirements – 244
Formal Requirements for Key Distribution Protocols – 238
- Means, C D**
Analyzing Decisions and Characterizing Information in C2 Systems – 305
- Meaux, Melanie**
Serving Fisheries and Ocean Metadata to Communities Around the World – 293
- Medard, M.**
Randomized Distributed Network Coding – 76
- Medina, JR, Richard L**
Numerical Solution of the Extended Non-linear Schrödinger Equation – 286
- Meehan, Kevin**
Implementation of Programmatic Quality and the Impact on Safety – 128
- Meehan, Timothy J**
Joint Demodulation of Low-Entropy Narrowband Cochannel Signals – 119
- Mehta, Satish**
Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204
- Meidunas, Eduardo C**
Robust Estimation of Mahalanobis Distances in Hyperspectral Images – 255
- Meirina, Candra**
Model-Based Organization Analysis and Design for an ESG Organization – 258
- Meisel, A.**
Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- Melfi, Mary L**
Causes and Effects of Fatigue in Experienced Military Aircrew – 6
- Mell, W E**
Effects of Finite Sample Width on Transition and Flame Spread in Microgravity – 70
- Melonakos, John**
Tissue Tracking: Applications for Brain MRI Classification – 281
- Meltzer, R S**
Role of Delocalized Charges in the Pyroelectric Effect – 273
- Menart, J**
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287

- Meng, M.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
- Menesson, Bertrand**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Menzies, Tim**
Software Development Cost Estimation Executive Summary – 256
- Meredith, Gloria E**
Identification of Splice Variants as Molecular Markers in Parkinson's Disease – 184
- Metzler, Donald**
Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks – 307
- Meyer, Patrick**
In-Space Crew-Collaborative Task Scheduling – 248
- Mi, B.**
Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – 67
- Mian, Zia**
Gauging U.S.-Indian Strategic Cooperation – 281
- Michael, James B**
Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79
New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
- Miga, Michael I**
Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178
- Mikula, Robert**
Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- Milbrandt, Jeffrey D**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172
- Milbrath, B. D.**
Comparison of LaBr₃:Ce and NaI(Tl) Scintillators for Radio-Isotope Identification Devices – 276
- Miller, Alexandra C**
Preconceptional Paternal Exposure to Embedded Depleted Uranium Fragments: Transmission of Genetic Damage to Offspring – 169
- Miller, Benjamin D**
Improvised Explosive Device Placement Detection from a Semi-Autonomous Ground Vehicle – 244
- Miller, Colin R**
Electromagnetic Pulse Threats in 2010 – 111
- Miller, D. C.**
Atomistic Modeling of Nanowires, Small-scale Fatigue Damage in Cast Magnesium, and Materials for MEMS – 43
- Miller, James C**
Causes and Effects of Fatigue in Experienced Military Aircrew – 6
Modeling Performance in C4ISR Sustained Operations: A Multi-level Approach – 196
- Miller, Joseph D.**
Detecting Life and Biology-Related Parameters on Mars – 196
- Milligan, James R**
Decision-Support Infosphere Services for Collaborative Operations and Virtual Environment Requirements (DISCOVER) – 9
- Millstein, D. E.**
Analysis of Particulate Nitrate and Black Carbon Time Series – 142
- Millwater, H**
Innovative Methods for Engine Health Monitoring – 20
- Min, Lim Y**
Leveraging C2/EDM for Enhancing Systems Interoperability – 151
- Miner, William**
Computational Science: Ensuring America's Competitiveness – 217
- Ming, D. W.**
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Ming, D.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- Ming, Douglas W.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- Minge, E.**
Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153
- Mintz, Eric A.**
Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- Miranda, Felix A.**
Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Miranda, Felix**
R.F. Microphotonics for NASA Space Communications Applications – 31
- Mirghafori, N**
Entropy Based Classifier Combination for Sentence Segmentation – 78
- Mishkin, Andrew H.**
Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218
From Prime to Extended Mission: Evolution of the MER Tactical Uplink Process – 311
- Mishra, Ashutosh**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
- Mitskevich, I. N.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Miyoshi, Kazuhisa**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Mizuno, Yosuke**
3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 117
A Magnetohydrodynamic Boost for Relativistic Jets – 116
General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319
- MLaughlin, John B.**
Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
- Mmeginniss, S. M.**
Two-Speed Manual Wheelchair – 210
- Mock, Jessica**
An Investigation of the Combined Effect of Stress, Fatigue and Workload on Human Performance: Position Paper – 206
- Molz, Maureen**
Collaborative Awareness: Experiments with Tools for Battle Command – 257
- Moniodis, Joseph J**
Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Monk, Donald**
Advanced Visualization for Operational Assessment (Briefing Charts) – 258
- Monnier, John D.**
2006 Interferometry Imaging Beauty Contest – 118

- Montes, Daniel R**
Mixing Effects of Pylon-Aided Fuel Injection Located Upstream of a Flameholding Cavity in Supersonic Flow (Postprint) – 114
- Moon, Terry**
A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238
- Moone, Sean**
Towards an Integrated Deployment and Crisis Response Planning System for C2 – 299
- Moore, Andrew P**
Increasing Assurance with Literate Programming Techniques – 295
- Moore, Chadwick A**
Measuring Night-Sky Brightness With a Wide-Field CCD Camera – 150
- Moore, Jim**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Moore, S. T.**
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
- Moore, W.**
Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Moreno, Jacqueline**
Vitamin D-Prostaglandin Interactions and Effects in Prostate Cancer – 185
- Morgan, H. D.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Morici, L.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Morrell, J. S.**
Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62
- Morris, J. Richard**
Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218
- Morris, R. V.**
Hydrothermal Synthesis of Hematite-Rich Spherules: Implications for Diagenesis and Hematite Spherule Formation in Outcrops at Meridiani Planum, Mars – 322
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Morris, R.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Morris, Richard V.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- Morris, Robert**
Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7
- Morris, Timothy R**
Standing Joint Force Headquarters - North: Improving the Federal Response to National Disaster Response Operations – 157
- Morse, J. W.**
Experimental and Analytic Studies to Model Reaction Kinetics and Mass Transport of Carbon Dioxide Sequestration in Depleted Carbonate Reservoirs – 145
- Moss, W. C.**
MOSSFRAC: An Anisotropic 3D Fracture Model – 42
- Mossberg, Thomas**
Lithographically-Scribed Planar Holographic Optical CDMA Devices and Systems – 102
- Mott, Randall D**
Computational Science: Ensuring America's Competitiveness – 217
- Moumen, Nadjoua**
Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
- Muccio, Michael T**
Joint Battlespace Infosphere: Information Management Within a C2 Enterprise – 230
- Mueller, Carl H.**
Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Mueller, S. F.**
Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- Muller, William J**
ERalpha and ErbB-2 Cross-talk in Mammary Tumorigenesis and Metastasis – 182
- Mullins, Ken**
Thin Thread Analysis – 258
- Mullins, Kenneth L**
A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225
- Mulrooney, Mark**
An Assessment of the Role of Solid Rocket Motors in the Generation of Orbital Debris – 30
- Mulyukin, A. L.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Munoz, Cesar A.**
Batch Proving and Proof Scripting in PVS – 213
- Murad, E**
Far-Field Spectral Analysis of a Space Shuttle Vernier Reaction Control System Firing – 26
- Murchie, S.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Murphy, Anne K**
A Framework for Supporting Teamwork between Humans and Autonomous Systems – 302
- Mycroft, Alan**
Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25
- Myers, J. D.**
Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – 213
- Myers, J. J.**
Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1
- Myers, Jack**
The Command and Control Joint Integrating Concept (C2 JIC) 'Spreading the Word' (Briefing Charts) – 240
- Myers, John M**
Operational Command and Control for Information Operations – 303
- Myers, Michael K**
How Can Unmanned Aerial Vehicles be Best Integrated into Homeland Security? – 17
- Nabity, James**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Nacchia, Roberto**
Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – 208
- Naftel, J. Chris**
NASA Global Hawk: A Unique Capability for the Pursuit of Earth Science – 134
- Naganuma, T.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Nagarajan, R.**
Enzymatic Template Polymerization – 40

- Naika, Rajesh R**
 Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Nair, Jyoti**
 International Heliophysical Year SCINDA Workshop/Abstract – 319
- Nakamura, Lori L.**
 A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219
- Nakamura-Messenger, K.**
 Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Nanni, A.**
 Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47
- Narang, K. J.**
 High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38
- Nardi, Silvia**
 European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Narkis, T. R.**
 Carbon Nanotube Schottky Barrier Photovoltaic Cell – 140
- Natapoff, A.**
 Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
 Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Natoli, M. J.**
 Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201
- Naughton, Jonathan W**
 Active Flutter Suppression Using Cooperative, High Frequency, Dynamic-Resonant Aero-Effectors – 3
- Navratil, P.**
 From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275
- Nayyar, A H**
 Gauging U.S.-Indian Strategic Cooperation – 281
- Neagley, D. L.**
 Identification Coding Schemes for Modulated Reflectance Systems – 97
- Necker, Carl**
 Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Neff, Joseph**
 Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100
- Negele, J. W.**
 Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270
- Negres, R. A.**
 Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284
- Negus, Charles**
 Overuse Injury Assessment Model – 202
- Neiderer, Andrew**
 Urban Battlespace Control: A New Concept for Battle Command – 135
- Nekoogar, F.**
 Network-Centric Maritime Radiation Awareness and Interdiction Experiments: C2 Experimentation – 212
- Nelander, A.**
 Gruppantenneteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Nelman-Gonzalez M.**
 Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Nelson, B. N.**
 Automated Inspection and Processing System – 211
- Nelson, W. R.**
 Calculations of Photoneutrons from Varian Clinac Accelerators and Their Transmissions in Materials – 291
- Nelson, W T**
 Instant Messaging and Team Performance in a Simulated Command and Control Environment (Briefing Charts) – 79
- Nessel, James A.**
 Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Neuner, J. W.**
 Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
- Neviere, Robert**
 Aging Properties of An HTPB Propellant – 260
- Newell, L.**
 Low Leakage Finger Seal – 44
- Newsome, Kolin C**
 Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- Ng, Cheuk-Yiu**
 The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Nguyen, Baochau N.**
 Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- Nguyen, Hung**
 R.F Microphotonics for NASA Space Communications Applications – 31
- Nichtern, Ofir**
 Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248
- Nickerson, C. A.**
 Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Nie, Daotai**
 A Tissue Engineering Approach to Study the Progression of Breast Tumor Metastasis in Bone – 187
- Nikiforov, S**
 Acoustic Design of Naval Structures – 278
- Nishikawa, Ken-Ichi**
 3D Relativistic Magnetohydrodynamic Simulations of Magnetized Spine-Sheath Relativistic Jets – 117
 General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319
- Nishikwa, Ken-Ichi**
 A Magnetohydrodynamic Boost for Relativistic Jets – 116
- Nissen, Mark E**
 Computational Modeling and Analysis of Networked Organizational Planning in a Coalition Maritime Strike Environment – 252
 Modeling Skill Growth and Decay in Edge Organizations: Near-Optimizing Knowledge and Power Flows (Phase Two) – 306
- Nitta, C. K.**
 Estimating Parametric, Model Form, and Solution Contributions Using Integral Validation Uncertainty Quantification – 274
- Nitzschke, Stephen G**
 Information Operations: A Conceptual Perspective for Staff Organization and Force Employment – 308
- Nixon, W E**
 Classification of Targets Using Optimized ISAR Euler Imagery – 74
 Exploitation of ISAR Imagery in Euler Parameter Space – 74
 Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73

- Noble, Sarah**
Assessing the Dangers of Moon Dust – 206
- Nocerino, John**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Nolan, M. C.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Nolen, John**
Enabling Effective Decisions – 239
- Nolting, J.**
Improving Interpolation in BoomerAMG – 213
- Nonn, Larisa**
Molecular Mechanism for Prostate Cancer Resistance to the Anti-tumor Activity of Vitamin D – 191
- Nordin, P.**
Planar Lightwave Circuit Waveguide Bends and Beamsplitters – 283
- Norgard, P**
A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- Norris, J. W.**
Turbine Engine disk Spacers – 21
Turbine Engine Rotor Retainer – 21
- North, Paul D**
Evaluating Net-Centric Command and Control via a Multi-Resolution Modeling Evaluation Framework: A FY05 IR&D Project – 262
- Novotny, John**
XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – 244
- Ntuen, Celestine A**
Cognitive Constructs and the Sensemaking Process – 86
The Knowledge Structure of the Commander in Asymmetric Battlefield: The Six Sights and Sensemaking Process – 92
- Nurmikko, A**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Nuth, III, J A**
Comparison of the Composition of the Tempel 1 Ejecta to the Dust in Comet C/Hale-Bopp 1995 O1 and YSO HD 100546 – 316
- Nygren, Y.**
Characterization of O-Alkyl Alkylphosphonic Acids by High-Energy Collision Induced Dissociation Negative Mode Electrospray Ionization Tandem Mass Spectrometry – 59
- O'Brien, Linsey**
Command Authority & Information Flows in Net-Centric Operations – 299
- ODonovan, Adam**
Coupled Groups of g-Modes in a Sun with Mixed Core – 326
- Oglesby, Robert J.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Oh, David Y.**
Performance Evaluation of an Expanded Range XIPS Ion Thruster System for NASA Science Missions – 36
- Ohi, J.**
Method for Testing Properties of Corrosive Lubricants – 41
- Ohta, S.**
Nucleon Structure in Lattice QCD with Dynamical Domain-Wall Fermions Quarks – 271
- O'Keefe, M**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Oldham, W. G.**
Double Hidden Flexure Microactuator for Phase Mirror Array – 98
- Olfati-Saber, Reza**
Flocking for Multi-Agent Dynamic Systems: Algorithms and Theory – 249
- Olszewski, M.**
Evaluation of 2005 Honda Accord Hybrid Electric Drive System. FY 2006 – 101
FreedomCAR Advanced Traction Drive Motor Development Phase I. FY 2006 – 108
- Olszta, M. J.**
Fibrous Minerals Methods for Their Production Using a Solution-Precursor-Solid Mechanism and Methods and Use – 47
- O'May, Janet**
Urban Battlespace Control: A New Concept for Battle Command – 135
- O'Neil, Graham**
Sustainable, Reliable Mission-Systems Architecture – 242
- Ong, Andy**
Leveraging C2I2EDM for Enhancing Systems Interoperability – 151
- Ong, M. M.**
Lightning Protection Certification for High Explosives Facilities at Lawrence Livermore National Laboratory – 154
Lightning Protection System for HE Facilities at LLNL-Certification Template – 154
- Oostdijk, J. P.**
Sleep and Alertness Management – 200
- Opiela, J.**
Improvements to NASA's Debris Assessment Software – 215
- Oppenheimer, Michael W**
Progress in Guidance and Control Research for Space Access and Hypersonic Vehicles (Preprint) – 3
- Orbey, N.**
No VOC Radiation Curable Resin Compositions with Enhanced Flexibility – 59
- Orginos, K.**
Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270
- Orlas, G.**
Airport Security System – 10
- Orr, James K.**
Sustainable, Reliable Mission-Systems Architecture – 242
- Ortiz, Roman D**
In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 83
- Osburn, M. R.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- Oseguera-Lohr, Rosa M.**
Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – 21
- Osga, Glenn**
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209
Modeling Supervisory Control and Team Performance in the Air Defense Warfare Domain with Queueing Theory. Part II – 7
- Oshman, Yaakov**
Optimal Integration of Estimation and Guidance for Interceptors – 251
- Ostro, S. J.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Ota, Dale K.**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- Ott, C. M.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Otto, C.**
Operator Site 2004-2005 (Operatorsplatsen 2004-2005) – 19
- Ou, Jao J**
Development of an Automated Modality-Independent Elastographic Image Analysis System for Tumor Screening – 178
- Oyler, George**
Expression and Cellular Internalization of Two Tat-Conjugated Fluorescent Proteins – 167

- Pabich, Paul J**
Hyperspectral Imagery: Warfighting Through a Different Set of Eyes – 280
- Pachter, Meir**
Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22
- Paczkowski, Brian G.**
The Cassini-Huygens Mission Overview – 311
- Padwal, A**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Pal, M.**
Protein Microarray System – 46
- Palmer, D**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Paloski, William H.**
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
- Pan, L.**
Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – 265
- Panackal, Ajay**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Pancheva, Dora**
3rd IAGA/ICMA Workshop on Vertical Coupling in the Atmosphere/Ionosphere System/ Abstract – 150
- Pantic-Tanner, Z**
Innovative Methods for Engine Health Monitoring – 20
- Park, E. S.**
Traffic Engineering Applications of Driving Simulation – 211
- Park, Joel T**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 114
- Parker, S.**
High Intensity Plasma Glass Melter Project. Final Technical Report Covering Period 07/28/03-07/27/06 – 69
- Parr, K.**
Final Environmental Assessment: Development of Ash Management Strategy, Allen Fossil Plant, Shelby County, Tennessee – 144
- Parra, M.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Parsa, Z.**
Intense Neutrino Beams and Leptonic CP Violation – 291
- Parthasarathy, Triplicane A**
Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- Pasquale, Elena B**
Tumor Suppressor Activity of the EphB2 Receptor in Prostate Cancer – 162
- Patrik, L.**
Operator Site 2004-2005 (Operatoers-platsen 2004-2005) – 19
- Pattipati, Krishna R**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
- Patrik, L.**
An Agent-Based Simulation Model for Organizational Analysis – 86
- Patrik, L.**
Model-Based Organization Analysis and Design for an ESG Organization – 258
- Patrik, L.**
PERSUADE: Modeling Framework for the Design of Modular Army Organizations – 224
- Pau, Silvia**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Paul, Heather**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Pautsch, A. G.**
Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 115
- Payne, Jr, Charles N**
Increasing Assurance with Literate Programming Techniques – 295
- Pearl, J.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Pearson ,II, F C**
The Way Ahead For Maritime UAVS – 19
- Pei, S-S S**
Phonon Enhancement of Electronic and Optoelectronic Devices – 105
- Pelkey, S.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Pellettiere, Joseph A**
Human Neck Response during Vertical Impact with Variable Weighted Helmets – 201
- Peng, C.**
Apparatus and Method for Coupling Light to a Thin Film Optical Waveguide – 98
- Pennington, Brett D**
Military-Media Relations: Lessons for the Joint Force Commander – 91
- Perala, Chuck H**
Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229
- Perala, Chuck H**
Workload and Stress of Crews Operating Future Manned Vehicles – 229
- Perkovich, George**
Gauging U.S.-Indian Strategic Cooperation – 281
- Perona, Pietro**
Motion from Fixation – 263
- Perrett, Mitchell R**
Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79
- Perrig, Adrian**
Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216
- Perronnet, M.**
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150
- Perronnet, M.**
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- Perry, Frank H**
Apparatus for Study of Ion-Thruster Propellant Ionization – 35
- Perry, Jay L.**
Cabin Air Quality On Board Mir and the International Space Station: A Comparison – 324
- Petars-Lidard, Christa D.**
Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- Petasis, N. A.**
Trihydroxy Polyunsaturated Eicosanoid Derivatives – 46
- Peter, Marcus E**
The Role of Capase-8 in Breast Carcinoma Cells – 189
- Petersen, B. A.**
Study of Charm Baryons with the BaBar Experiment – 268
- Peterson, Blake R**
Anticancer Inhibitors of AR-Mediated Gene Expression – 172
- Peterson, Derick R**
Identification of High-Dimensional Prognostic Gene Signatures for Breast Cancer Survival – 186
- Petkova, Desislava**
UMass at TREC 2006: Enterprise Track – 87
- Petkovska, Menka**
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41

- Pettersson, L.**
Gruppennteknik och Programmerbara Mikrovaegssystem Slutrapport (Array Antenna Technology and Programmable Microwave Systems-Final Report) – 89
- Pettersson, M.**
Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88
- Pettitt, Rodger A**
Effects of Alerts on Army Infantry Platoon Leader Decision Making Performance – 299
- Pezzopane, Michael**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Pfautz, Jonathan**
The Role of Meta-Information in C2 Decision-Support Systems – 298
- Philippens, I. H. C. H. M.**
Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199
Sleep and Alertness Management – 200
- Philippens, I H**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202
- Phillips, Mark**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Phillips, Robert G.**
A Coordinated Initialization Process for the Distributed Space Exploration Simulation – 232
- Phoenix, Leigh**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Pidhayny, D. D.**
Methods and Systems for Tracking Signals with Diverse Polarization Properties – 107
- Pido, Kelle**
The Importance of Multilateral Safety Requirements for Human Spaceflight – 30
- Pierre-Laborie, Marie**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Pierson, D. L.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Pierson, Duane**
Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204
- Pietrella, Marco**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Pigeau, Ross**
C2 Policy: What's it for? – 85
- Pilorz, S.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Pitchford, Leanne C**
Microdischarge Sources of O2(singlet Delta) – 288
- Pittman, Jasna V.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Pittman, William C**
Evolution of the Department of Defense Millimeter and Microwave Monolithic Integrated Circuit Program – 111
- Platts, D.**
Identification Coding Schemes for Modulated Reflectance Systems – 97
- Platts, S.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Platz, Elizabeth A**
Genes Involved in Oxidation and Prostate Cancer Progression – 186
Telomere Length as a Predictor of Aggressive Prostate Cancer – 184
- Plaxco, K. W.**
Reagentless, Reusable, Bioelectronic Detectors and Their Use as Authentication Devices – 109
- Pleijsier, K.**
Sleep and Alertness Management – 200
- Plymate, Stephen R**
Superoxide Dismutase and Transcription Factor sox9 as Mediators of Tumor Suppression by mac25 (IGFBP-rp1) in Prostate Cancer Cells – 189
- Pochinsky, A. V.**
Nucleon Structure in the Chiral Regime with Domain Wall Fermions on an Improved Staggered Sea – 270
- Poglazova, M. N.**
Super-long Anabiosis of Ancient Microorganisms in Ice and Terrestrial Models for Development of Methods to Search for Life on Mars, Europa and other Planetary Bodies – 312
- Pollini, Lorenzo**
Intelligent Control Management of Autonomous Air Vehicles – 15
- Pollock, N. W.**
Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201
- Polzin, Kurt A.**
Bismuth Propellant Feed System Development at NASA-MSFC – 71
- Ponick, Terry L**
Computational Science: Ensuring America's Competitiveness – 217
- Popkin, Jan**
The Emerging Importance of Business Process Standards in the Federal Government – 226
- Popovic, S.**
Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2
- Potter, Scott S**
Making Sense of Sensemaking: Requirements of a Cognitive Analysis to Support C2 Decision Support System Design – 81
- Pouch, John**
R.F Microphotonics for NASA Space Communications Applications – 31
- Powell, C. T.**
Method and Apparatus for Estimating a Parameter Based on a Plurality of Redundant Signals – 108
- Prakash, C.**
Triple Circuit Turbine Blade – 35
- Presby, Timothy D**
Computer Network Attack and Its Effectiveness against Non-State Actors – 242
- Pressel, Daniel M**
FPGAs and HPC – 227
- Pressley, Corey S**
Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82
- Presson, Joan**
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
- Prieto-Ballesteros, O.**
Mars Sulfate Formation Sourced in Sulfide-Enriched Subsurface Fluids: The Rio Tinto Model – 322
- Prior, Stephen**
Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 195
- Prior, Susan**
Net-Centric Capability and Improved Battlefield Care: Placing the Doctor in the Battlefield – 195

- Pritchett, Victor E.**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- Proto, Loredana**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – 318
- Proulx, Pascale**
Visible Battle Rhythm – 209
- Pruet, J.**
Alternative Approach to Nuclear Data Representation: Building the Infrastructure to Support QMU and Next-Generation Simulations – 266
T-REX Design Considerations for Detection of Concealed 238U – 268
- Psaker, A.**
Inclusive and Exclusive Compton Processes in Quantum Chromodynamics – 277
- Puatua, W K**
Very Large Array Plus Pie Town Astronomy of 46 Radio Stars – 316
- Puder, Mark**
Angiogenesis Research to Improve Therapies for Vascular Leak Syndromes, Intra-Abdominal Adhesions, and Arterial Injuries – 188
- Puech, Vincent**
Microdischarge Sources of O₂(singlet Delta) – 288
- Puperi, Daniel**
Impact to Space Shuttle Vehicle Trajectory on Day of Launch from change in Low Frequency Winds – 29
- Puronit, V. S.**
Compositions and Methods for Less Immunogenic Protein Formulations – 46
- Qian, Zheng D**
Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 187
- Quake, S. R.**
High Throughput Screening of Crystallization of Materials – 44
- Quattrochi, Dale A.**
Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137
NASA'S SERVIR Gulf of Mexico Project: The Gulf of Mexico Regional Collaborative (GoMRC) – 233
The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 137
- Rabinovsky, Rosalia**
Identification and Validation of PTEN Complex, Associated Proteins – 182
- Rabitz, H.**
Accelerating the Discovery of Effective Photonic Reagents – 45
- Radousky, H. B.**
Laser-induced Defect Reactions Governing Damage Performance in KDP and DKDP Crystals – 284
- Raghavan, Deepar**
Two Suns in the Sky: Stellar Multiplicity in Exoplanet Systems – 315
- Raghavan, Hema**
Tandem Learning: A Learning Framework for Document Categorization – 295
- Raivo, B. D.**
Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99
- Rajaraman, R**
Gauging U.S.-Indian Strategic Cooperation – 281
- Ralph, W.**
Silica Extraction at the Mammoth Lakes Geothermal Site – 67
- Ramana, M V**
Gauging U.S.-Indian Strategic Cooperation – 281
- Ramani, K.**
Compositions and Methods for Less Immunogenic Protein Formulations – 46
- Ramesham, Rajeshuni**
Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100
- Ramotowski, Thomas S**
Castable and High Modulus Acoustic Dampening Material – 306
- Ramsay, Christopher M.**
NASA's Software Safety Standard – 231
- Ramseyer, George**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Rantakokko, J.**
Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284
- Rappaport, N. J.**
Interiors of Enceladus and Rhea – 314
- Raquet, John**
Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12
Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12
Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22
- Rasmussen, Robert D.**
Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218
- Rastatter, L.**
Community Coordinated Modeling Center Support of Operations: Real-Time Simulations and V & V. – 233
- Rathi, Yogesh**
Comparative Analysis of Kernel Methods for Statistical Shape Learning – 245
Particle Filtering With Dynamic Shape Priors – 251
Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246
- Raush, P. J.**
Proceedings of the International Symposium on Advanced Radio Technologies. Held in Boulder, Colorado on February 26-28, 2007 – 77
- Ray, T. L.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Reavis, Gretchen**
Analytical Investigation of Pumped Fluid Loop Radiators for Orion Spacecraft – 32
- Rebak, R. B.**
Effect of Chemistry Variations in Plate and Weld Filler Metal on the Corrosion Performance of Ni-Cr-Mo Alloys – 64
Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 53
Selection of Corrosion Resistant Materials for Nuclear Waste Repositories – 59
- Reddick, Bobbie**
Developing a Training Program in Breast Cancer Research to Decrease the Disparity of Morbidity and Mortality in Underserved/Minority Women – 185
- Redding, David C.**
Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285
- Reed, Daniel A**
Computational Science: Ensuring America's Competitiveness – 217
- Regan, Timothy F.**
Control of Dual-Opposed Stirling Convertors with Active Power Factor Correction Controllers – 100
- Reichard, T. D.**
Adaptive Channel Equalization Technique and Method for Wideband Passive Digital Receivers – 94
- Reilly, R T**
Can Reproductive Hormones Modulate Host Immunity to Breast Cancer Antigens – 186

- Reinhard, Scott W**
Joint Strike Fighter Across the Atlantic: To Unify or Divide – 14
- Reisman, D. B.**
Isentropic Compression with a Rectangular Configuration for Tungstene and Tantalum, Computations and Comparison with Experiments – 61
- Ren, Z.**
Carbon Nanotube Nanoelectrode Arrays – 110
- Rengaswamy, Sridharan**
2006 Interferometry Imaging Beauty Contest – 118
- Renhorn, I.**
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- Reniers, Ad**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Renner, Scott**
Command Authority & Information Flows in Net-Centric Operations – 299
- Reppert, T.**
US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126
- Reynolds, Joseph P**
Validating DoD Architectures: The Promise of Systems Engineering – 239
- Ribeiro, C.**
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Rice, Aaron**
Dynamic Decision Support for Time Critical Targeting – 7
- Richard, Erik C.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Richards, Billy**
Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
- Richards, D.**
Exotic and Higher Spin Mesons in Charmonium – 271
- Richardson, J. D.**
Thermodynamic Structure of Collision-Dominated Expanding Plasma: Heating of Interplanetary Coronal Mass Ejections – 312
- Richardson, J. G.**
Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99
- Richardson, Lea**
In-Space Crew-Collaborative Task Scheduling – 248
- Richardson, Sean**
Experiments into the Operation and Effectiveness of Edge Organizations – 90
- Rickhards, D.**
Hadron Structure from Lattice QCD – 276
- Rickman, Douglas L.**
A Numerical Study of the Urban Heat Island in the Coastal Tropical City of San Juan, Puerto Rico: Model Validation and Impacts of LCLU Changes – 137
- Characterization of Forested Landscapes From Remotely Sensed Data Using Fractals and Spatial Autocorrelation – 137
- Rider, Andrew N**
Prebond Inspection Techniques to Improve the Quality of Adhesive Bonding Surface Treatments – 15
- Ridley, Brian A.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Rinehart, Christopher S**
Gas Generator Actuator Arrays for Flight Control of Spinning Body Projectiles – 114
- Ripley, E. B.**
Displacement Method and Apparatus for Reducing Passivated Metal Powders and Metal Oxides – 62
- Rizzo, A.**
Strengthening of Rural Bridges Using Rapid-Installation FRP Technology – 47
- Roach, J. A.**
Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99
- Roberts, M. D.**
Method and System for Extensible Position Location – 214
- Rocca, Jennifer**
Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32
- Rock, J. C.**
Hybrid-Phased Communication Array – 107
- Rockway, J. W.**
Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – 99
- Rockway, J.**
Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – 113
- Rodeck, Ulrich**
Molecular Characterization of Squamous Cell Carcinomas From Recessive Dysplastic Epidermolysis Bullosa – 194
- Rodriguez, Ernesto**
Towards Mapping the Ocean Surface Topography at 1 km Resolution – 159
- Roelvink, Dano**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Roesener, August G**
An Advanced Tabu Search Approach to the Airlift Loading Problem – 251
- Roeske, F.**
One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268
- Rogers, Bret Z**
Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm – 208
- Rogers, Ernest O**
Hydrodynamic Performance of a Dual-Slotted Circulation Control Wing of Low-Aspect Ratio – 114
- Rohwer, Robert G**
Development of an Assay for the Detection of PrPres in Blood and Urine Based on PMCA Assay and ELISA Methods – 162
- Efficient and Rapid Development of Transgenic Hamster Models of TSEs Using a Radical New Technology – 181
- Rojas, Roberto A.**
Optical Phased Array Antennas using Coupled Vertical Cavity Surface Emitting Lasers – 122
- Romrell, Calvin J**
The USAF Installation Control Center (ICC) – 90
- Roof, William H**
Command World – 80
- Rose, Harry**
Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Rose, R.**
Radar Images of Asteroid 100085 (1992 UY4) – 313
- Rose, Summer**
International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- Rosenberger, Andrew H**
Microstructure and Temperature Effects on the Fatigue Variability Behavior of AN alpha+beta Titanium Alloy and Implications for Life Prediction (Postprint) – 64
- Rosenthal, Annie**
Command Authority & Information Flows in Net-Centric Operations – 299

- Rosenwaks, Zamik**
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 123
- Rosenzweig, J. B.**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271
- Rosenzweig, V.**
Methods for Wireless Mesh Multicasting – 214
- Roth, Emilie**
The Role of Meta-Information in C2 Decision-Support Systems – 298
- Rotman, Stanley**
Spatial and Temporal Point Tracking in Real Hyperspectral Images – 248
- Rousseau, Antoine**
Microdischarge Sources of O₂(singlet Delta) – 288
- Rowe, Gary W**
Shallow Water UXO Technology Demonstration Site Scoring Record Number 4 (CTC, FEREX, DLG-GPS, MAG) – 119
Shallow Water UXO Technology Demonstration Site Scoring Record Number 5 (NAEVA/XTECH, EM61 MKII) – 120
- Ruan, Jianzhong**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Ruan, Sui**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
An Agent-Based Simulation Model for Organizational Analysis – 86
- Ruf, Joe**
Calculating Nozzle Side Loads using Acceleration Measurements of Test-Based Models – 131
- Russell, Brian**
Q5 Known Good Substrates – 103
- Russo, Dane M.**
Human Research Program: Space Human Factors and Habitability Element – 210
- Rybalkin, Victor**
Mechanisms of Iodine Dissociation in Chemical Oxygen Iodine Lasers – 123
- Ryley, A**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- Ryutov, D. D.**
Physics Analysis of a Gas Attenuator with Argon as a Working Gas – 269
- Saber, Reza O**
A Unified Analytical Look at Reynolds Flocking Rules – 249
- Sabie, J.**
Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153
- Sabin, A.**
Two-Speed Manual Wheelchair Wheel – 210
- Sachs, E. M.**
Infiltrating a Powder Metal Skeleton by a Similar Alloy with Depressed Melting Point Exploiting a Persistent Liquid Phase at Equilibrium, Suitable for Fabricating Steel Parts – 61
- Sacks, J.**
Technical Report on Ozone Exposure, Risk, and Impact Assessments for Vegetation – 148
- Sadauskas, Leonard**
Human Interface to Netcentricity – 308
- Saeks, R.**
Shock Structure Analysis and Aerodynamics in a Weakly Ionized Gas Flow – 2
- Safron, S. A.**
Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 290
- Sahlstrom, Ted**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Sakari, P.**
Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284
- Salamacha, Christine O**
Support for Dynamic Collaborative Action Teams – 232
- Saleh, Mohammad A**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Salehi, I. A.**
LNG Safety Research: FEM3A Model Development – 146
- Salem, Ayman**
Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Salmon, L. G.**
Microscopic Batteries for MEMS Systems – 97
- Sams, Clarence**
Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204
- Samuelson, L. A.**
Enzymatic Template Polymerization – 40
- Sanders, Jeffrey H.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Sandford, Scott A.**
Organics Captured from Comet Wild 2 by the Stardust Spacecraft – 317
- Santanello, Joseph A., Jr.**
Improved Modeling of Land-Atmosphere Interactions using a Coupled Version of WRF with the Land Information System – 158
- Santivanez, C. A.**
Methods for Wireless Mesh Multicasting – 214
- Santos, Jr , Eugene**
Intent Driven Adversarial Modeling – 261
- Sarnholm, E.**
Greenhouse Gas Emissions Trading for the Transport Sector – 148
- Sarrazin, P.**
Mineralogical In-situ Investigation of Acid-Sulfate Samples from the Rio Tinto River, Spain, with a Portable XRD/XRF Instrument – 132
- Satyanarayanan, M**
Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216
- Saulsberry, Regor**
Pyrovalve Blowby Tests – 128
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Saxena, S.**
Update of the Non-State Trunk Inventory – 236
- Saxon, E.**
Chemoselective Ligation – 52
- Sayres, David S.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Scannell, W. T.**
Repair and Rehabilitation of Bridge Components Containing Epoxy-Coated Reinforcement – 69
- Scarano, Jay**
Command Authority & Information Flows in Net-Centric Operations – 299
- Scarffe, V.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77

- Schaefer, Larry J**
Sustained Space Superiority: A National Strategy for the USA – 27
- Schauppner, Craig T**
Measuring the Immeasurable: Applying Hierarchical Holographic Modeling to Developing Measures of Effectiveness for Stability, Security, Transition, and Reconstruction Operations – 305
- Scheerer, Eric M**
Modeling Dynamics and Exploring Control of a Single-Wheeled Dynamically Stable Mobile Robot with Arms – 247
- Scheiman, Chris**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Scheiman, Daniel A.**
Low-melt Viscosity Polyimide Resins for Resin Transfer Molding (RTM) II – 47
- Scheiner, Steve**
Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229
- Scher, E.**
Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices – 99
- Scherbarth, Mark R**
Development of a Passively Deployed Roll-Out Solar Array – 9
- Schickel, Robert**
The Role of Caspase-8 in Breast Carcinoma Cells – 189
- Schlegel, T. T.**
Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Schlegel, T.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198
- Schlingmeier, David**
CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121
- Schmidt, C.**
Thermodynamics of (2+1)-Flavor QCD – 270
- Schmidt, M. E.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- Schneider, Todd**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288
- Schoenbach, Karl H**
A Fast, Parallelized Computational Approach Based on Sparse LU Factorization, for Predictions of Spatial and Time-Dependent Currents and Voltages in Full-Body Bio-Models – 253
- Schonberg, W.**
Incorporation of Hands-on Experiments in an Introductory Structural Analysis Course – 1
- Schone, P**
QACTIS Enhancements in TREC QA-2006 – 305
- Schreiber, Brian T**
AOC Embedded Performance Measurement and Assessment – 228
- Schreiber, Jeffrey G.**
Control of Dual-Opposed Stirling Convertors with Active Power Factor Correction Controllers – 100
- Schroeder, David J**
Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13
- Schuchardt, K. L.**
Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – 213
- Schulte, R. W.**
Nanodosimeter Based on Single Ion Detection – 265
- Schurr, J. R.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Schurr, M. J.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Schwandt, C. S.**
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – 150
- Scott, B.**
Test Methods for Evaluating Field Performance of RWIS (Road Weather Information Systems) Sensors – 153
- Scott, Charles P.**
NASA's Spitzer Space Telescope's Operational Mission Experience – 314
Spitzer Pre Launch Mission Operations System - The Road to Launch – 314
- Scott, Peter D**
Information Fusion for Natural and Man-Made Disasters – 304
- Scott, R L**
Space-Based Observations of Satellites From the MOST Microsatellite – 25
- Scrocca, James**
Collaborative Awareness: Experiments with Tools for Battle Command – 257
- Seal, D. A.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – 77
- Sebastyn, Jerome T**
Command World – 80
- See, T. H.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Seelos, F.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Seelos, K.**
Characteristics of the Mars Pathfinder Landing Site from CRISM Hyperspectral Imaging – 151
- Segletes, Steven B**
Constraints on the Grueneisen Theory – 252
- Seidel, David**
Progressing Toward a Net-Centric DoD: Leveraging Lessons Learned from Distributed Simulation Experiences – 227
- Semiatin, S L**
Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65
- Semmes, Edmund B.**
Comprehensive Shuttle Foam Debris Reduction Strategies – 50
Cross Cutting Structural Design for Exploration Systems – 325
- Senglaub, Michael**
Fusion Sub-System Design From an Integrated Command, Decision Support and ISR Perspective – 264
- Serabyn, Eugene**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Serak, Svetlana V**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Seth, Curt A**
JCAS: Psst, the 'J' Stands for Joint – 88
- Sexton, D.**
Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Seybold, Calina**
Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – 32

- Sgobba, Tommaso**
International Cooperation in the Field of International Space Station (ISS) Payload Safety – 310
- Shackelford, L. C.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
- Shafer, Mary-Ann**
Preventing Health Damaging Behaviors and Negative Health Outcomes in Army and Marine Corps Personnel during the First Tour of Duty – 174
- Shames, Peter**
Toward a Framework for Modeling Space Systems Architectures – 236
Towards a Framework for Modeling Space Systems Architectures – 220
- Shang, J**
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287
- Shannon, Kevin**
Preclinical Mouse Models of Neurofibromatosis – 191
- Shapiro, Andrew A.**
Ultra Reliability Workshop Introduction – 128
- Sharp, W. M.**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- Sharps, Paul**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Shattuck, Lawrence G**
A Dynamic Process Model for the Design and Assessment of Network Centric Systems – 209
- Shattuck, Michael**
Radio Path Prediction Software for Command and Control Scenario Developers – 259
- Schemelinin, S.**
Nanosimeter Based on Single Ion Detection – 265
- Shedd, T. A.**
Full Coverage Spray and Drainage System and Method for Orientation-Independent Removal of High Heat Flux – 115
- Sheets, S. A.**
Electromechanical Actuators – 108
- Shen, S.**
Physics Analysis of a Gas Attenuator with Argon as a Working Gas – 269
- Shen, Shaoxiong**
Rare-Earth Oxide Ion (Tm³⁺, Ho³⁺, and U³⁺) Doped Glasses and Fibres for 1.8 to 4 Micrometer Coherent and Broadband Sources – 55
- Shen, Weixin**
Overuse Injury Assessment Model – 202
- Shen, Y.**
Fuel Chemistry Impacts in Gasoline HCCI – 146
- Sheppard, Arthur**
Battle Lab Simulation Collaboration Environment (BLSCE): Multipurpose Platform for Simulation C2 – 82
- Sher, E. C.**
Shaped Nanocrystal Particles and Methods for Working the Same – 39
- Sherby, O.**
c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61
Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- Shi, Fang**
Performance of Dispersed Fringe Sensor in the Presence of Segmented Mirror Aberrations - Modeling and Simulations – 285
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Shi, Y E**
Stimulation of Estrogen Receptor Signaling in Breast Cancer by a Novel Chaperone Synuclein Gamma – 179
- Shield, George C**
Development of a Computational Assay for the Estrogen Receptor – 179
- Shields, Jacqueline**
An in Vitro Study of Breast Cancer Invasion into the Lymphatics – 177
- Shin, Jong-Yeob**
Quasi-Linear Parameter Varying Representation of General Aircraft Dynamics Over Non-Trim Region – 1
- Shinar, Josef**
Optimal Integration of Estimation and Guidance for Interceptors – 251
- Shing, Man-Tak**
Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79
New Directions in C2 Software Quality Assurance Automation Based on Executable Environment Models – 228
- Shmitt, Terri**
Preliminary Performance Analyses of the Constellation Program ARES 1 Crew Launch Vehicle – 33
- Show, Y.**
Boron-Doped Nanocrystalline Diamond – 96
- Showalter, M.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Shribak, M.**
Orientation Independent Differential Interference Contrast Microscopy Technique and Device – 283
- Shriberg, E**
Entropy Based Classifier Combination for Sentence Segmentation – 78
- Shriberg, Elizabeth**
Comparing Evaluation Metrics for Sentence Boundary Detection – 74
- Shroff, Y.**
Double Hidden Flexure Microactuator for Phase Mirror Array – 98
- Shum, Allen**
Notes on the SHUMA Protocol. Scalable Access to Link-16 Time Slots – 87
- Sidhul, Sukh S**
Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – 272
- Sih, Bryant L**
Overuse Injury Assessment Model – 202
- Silbaugh, Eric E**
Network-Centric Operations: Challenges and Pitfalls – 242
- Silberberg, David P**
Support for Dynamic Collaborative Action Teams – 232
- Simniceanu**
A Parallel Saturation Algorithm on Shared Memory Architectures – 236
- Simpson, Marvin L**
A White Paper on the Conceptual Requirements for an Operational Airpower Planning Tool – 241
- Sims, Christopher R.**
International Space Station US. GN&C Momentum Manager Controller Design for Shuttle Thermal Protection System Repair – 31
- Sims, J. L.**
Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- Sims, R. C.**
Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- Singleton, W.**
Automated Inspection and Processing System – 211
- Sizemore, J**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Sjoqvist, L.**
Optisk Retrokommunikation, Statusrapport (Optical Retro Communication, Progress Report) – 284

- Skipper, Joseph**
Toward a Framework for Modeling Space Systems Architectures – 236
Towards a Framework for Modeling Space Systems Architectures – 220
- Skofronick, J. G.**
Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 290
- Skorka Burgess, Michelle**
System and Method of Use for Electrochemical Measurement of Corrosion – 65
- Slack, William G**
Employing Organizational Modeling and Simulation to Reduce F/A-18E/F F414 Engine Maintenance Time – 3
- Slattery, Kevin**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Slebodnick, P.**
Automated Inspection and Processing System – 211
- Slocik, Joseph M**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – 41
- Smith, B. L.**
Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 77
- Smith, Jessica B.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Smith, Paul**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Smith, Peter A**
Exploring Visual Adaptation at High Intensity Levels Using a Pulse-Probe Paradigm – 208
- Smith, Reuben**
Network Event Correlation Using Unsupervised Machine Learning Algorithms – 233
- Smith, S. M.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – 206
Nutritional Status Assessment (SMO 016E) – 203
- Smith, Timothy**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Smith, Tom**
QACTIS Enhancements in TREC QA-2006 – 305
- Snead, C.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Soatto, Stefano**
Motion from Fixation – 263
- Soelberg, N. R.**
Induction Coil Configurations, Bottom Drain Assemblies, and High-temperature Head Assemblies for Induction Melter Apparatus and Methods of Control and Design Therefor – 99
- Sokolski, Henry**
Gauging U.S.-Indian Strategic Cooperation – 281
- Solis, William M**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Solterbeck, William**
Operational Thread Development: A Structured Approach to Capability Analysis – 225
- Somenzi, L.**
Interiors of Enceladus and Rhea – 314
- Song, Kai**
Grain Boundary Curvature in a Model Ni-Based Superalloy (Preprint) – 65
- Sonthalia, P.**
Boron-Doped Nanocrystalline Diamond – 96
- Sorensen, D. L.**
Champion International Superfund Site, Libby, Montana Field Performance Evaluation. Bioremediation Unit: 'In situ' Bioremediation of the Upper Aquifer – 51
- Sorroche, Joe**
Tactical Digital Information Link-Technical Advice and Lexicon for Enabling Simulation (TADIL-TALES) II: Link 11/11B – 84
- Soukhojak, A.**
Electromechanical Actuators – 108
- Spann, J. F.**
Summary of Sessions: Ionosphere - Thermosphere - Mesosphere Working Group – 132
- Spann, James F., Jr.**
Measurements Required to Understand the Lunar Dust Environment and Transport Mechanism – 324
- Spann, James F.**
Challenges to modeling the Sun-Earth System: A Workshop Summary – 158
Heliophysics Science Enabled By the Return to the Moon – 325
- Sparks, Todd E**
Automated Slicing for a Multi-Axis Metal Deposition System (Preprint) – 130
- Speier, Richard**
Gauging U.S.-Indian Strategic Cooperation – 281
- Spence, Harlan**
Heliophysics Science Enabled By the Return to the Moon – 325
- Spetka, Scott**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Spicer, T.**
LNG Safety Research: FEM3A Model Development – 146
- Spilker, Linda J.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Spitsbery, I.**
Thermal Barrier Coating – 68
- Springer, Paul L.**
CAISSON: Interconnect Network Simulator – 237
- Spruce, Joseph P.**
Derivation of Effective Aerodynamic Surface Roughness in Urban Areas from Airborne Lidar Terrain Data – 134
Evaluation of a Potential for Enhancing the Decision Support System of the Interagency Modeling and Atmospheric Assessment Center with NASA Earth Science Research Results – 133
- Spruck, Charles H**
Identification of Genes Involved in Breast Tumor Invasion Utilizing a Ubiquitin-Mediated Proteolysis in Vitro Screen – 188
The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183
- Squillace, Rachel**
Generation of in Vitro Cellular Models of Lymphangioliomyomatosis for the Development of Tuberous Sclerosis Therapeutics – 174
- Sreekumar, A.**
Protein Microarray System – 46
- Stadermann, F. J.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Stadmuller, R.**
On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147
- Stanard, Terry**
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209
- Stanfield, S**
Study of Plasma Electrode Arrangements for Optimum Lift in a Mach 5 Flow (Postprint) – 287
- Stanley, R J**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Stansbery, Eileen K.**
Solar Wind Induced Substrate Alteration on Genesis Array Materials and H+ Diffusion at L1 – 327

- Staples, Brian**
Identifying Potential Implications of Technologies on Military and Security Operations – 261
- Starbird, Thomas W.**
Application of State Analysis and Goal-Based Operations to a MER Mission Scenario – 218
- Stawasz, M.**
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – 45
- Stedman, D. H.**
On-Road Remote Sensing of Automobile Emissions in the Chicago Area: Year 7, February 2007 – 147
- Steeffel, C. I.**
Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their and Influence on Reactive and Transport. 2006 ERSD Annual Report – 53
- Stefanyshyn-Piper, H. M.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Steffan, Robert**
Immobilization of Energetics on Live Fire Ranges (CU-1229). Revision 1.0 – 166
- Steffes, Gary**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Steffes, G**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – 130
- Stenger, M.**
Cardiac and Vascular Function in Bed-rested Volunteers: Effects of Artificial Gravity Training – 198

Effect of Head-Down Bed Rest and Artificial Gravity Countermeasure on Cardiac Autonomic and Advanced Electrocardiographic Function – 199
- Stenkamp, V. S.**
Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids – 116
- Stephan, E. G.**
Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – 213
- Stephan, Ryan**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Stephenson, John**
Gauging U.S.-Indian Strategic Cooperation – 281
- Sterling, Bruce S**
Effects of Crew-Aiding Behaviors on Soldier Performance During Target Engagement Tasks in a Virtual Battlefield Simulation – 229

Workload and Stress of Crews Operating Future Manned Vehicles – 229
- Stetcu, I.**
From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275
- Stewart, Fred M**
FORCEnet Net Centric Architecture - A Standards View – 239
- Stirtzinger, Tony**
Scenario Generation to Support Mission Planning – 226
- Stock, William**
AOC Embedded Performance Measurement and Assessment – 228
- Stodieck, L.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – 197
- Stodilka, Robert Z**
Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event – 159
- Stoica, Adrian**
Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – 100
- Stoler, P.**
Search for Pentaquarks with CLAS – 272
- Stowe, Raymond**
Monitoring Immune System Function and Reactivation of Latent Viruses in the Artificial Gravity Pilot Study – 204
- Straat, Patricia A.**
Detecting Life and Biology-Related Parameters on Mars – 196
- Straubinger, R. M.**
Compositions and Methods for Less Immunogenic Protein Formulations – 46
- Street, Kenneth W., Jr.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Strohman, Trevor**
Indri at TREC 2006: Lessons Learned From Three Terabyte Tracks – 307
- Struve, K. W.**
Conceptual Design for a Linear-Transformer Driver (LTD)-Based Refurbishment and Upgrade of the Saturn Accelerator Pulse-Power System – 276
- Stuckman, Dana E**
The Proliferation Security Initiative: Cooperative Process or Command and Control Nightmare? – 88
- Studor, George**
'Fly-by-Wireless': A Revolution in Aerospace Vehicle Architecture for Instrumentation and Control – 34
- Stuhmiller, James H**
Overuse Injury Assessment Model – 202
- Stukes, Sherry**
NASA Software Estimating Tool (N-SET) – 218
- Sturdevant, Kathryn F.**
A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219
- Sturm, Jeff**
An Assessment of ELINT Exploitation for Situational Awareness Visualisations on Operator Situational Awareness – 231
- Subramanian, R, Shankar**
Experiments on the Motion of Drops on a Horizontal Solid Surface due to a Wettability Gradient – 112
- Suciu, G. L.**
Turbine Engine Rotor Retainer – 21
- Sugarman, Kristi**
Battle of the Bulge: The Impact of Information Age Command and Control on Conflict – 82
- Suiciu, G. L.**
Turbine Engine disk Spacers – 21
- Sullivan, Karl S**
A Framework for Architecture-Based Planning and Assessment to Support Modeling and Simulation of Network-Centric Command and Control – 225
- Sullivan, Patrick D**
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- Sullivan, Shelby**
Thin Thread Analysis – 258
- Summers, Valerie A**
Transitioning Research Concepts to the Command and Control Community Quickly – 80
- Surie, Ajay**
Rapid Trust Establishment for Transient Use of Unmanaged Hardware – 216
- Svensson, T.**
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – 107
- Swager, T. M.**
Emissive Sensors and Devices Incorporating These Sensors – 96
- Swain, G. M.**
Boron-Doped Nanocrystalline Diamond – 96
- Swartz, Melody**
An In Vitro Study of Breast Cancer Invasion into the Lymphatics – 177

- Syn, C.**
c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61
Nano-Carbides and the Strength of Steels as Assessed by Electrical Resistivity Studies – 62
- Syverson, Paul**
A Logical Language for Specifying Cryptographic Protocol Requirements – 244
Formal Requirements for Key Distribution Protocols – 238
- Tabiryan, Nelson V**
Photovoltaic Field-Induced Self-Phase Modulation in Liquid Crystal Cells (Preprint) – 57
Self-Activated Liquid Crystal Cells Using Photovoltaic Substrates (Postprint) – 55
- Tai, C.**
US10 Capable Prototype Volvo MG11 Natural Gas Engine Development: Final Report December 16, 2003-July 31, 2006 – 126
- Takeuchi, J. S.**
Waveguide Apparatus and Method – 93
- Talbott, T. D.**
Mapping Physical Formats to Logical Models to Extract Data and Metadata: The Defuddle Parsing Engine – 213
- Tam, M.**
Ion Mobility Spectrometry Method and Apparatus – 266
- Tang, Nghia**
Onboard Classifiers for Science Event Detection on a Remote Sensing Spacecraft – 131
- Tang, X N**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Tankenson, Michael**
A Multi-mission Event-Driven Component-Based System for Support of Flight Software Development, ATLO, and Operations first used by the Mars Science Laboratory (MSL) Project – 219
- Tannenbaum, Allen**
Comparative Analysis of Kernel Methods for Statistical Shape Learning – 245
Particle Filtering With Dynamic Shape Priors – 251
Shape-Based Approach to Robust Image Segmentation Using Kernel PCA – 246
Tissue Tracking: Applications for Brain MRI Classification – 281
- Tanner, D**
Innovative Methods for Engine Health Monitoring – 20
- Tarrio, C.**
EUV Testing of Multilayer Mirrors: Critical Issues – 274
- Tatom, John W**
Approved Methods and Algorithms for DoD Risk-Based Explosives Siting – 255
User's Reference Model Safety Assessment for Explosives Risk (SAFER) Risk Analysis Software – 230
- Tauson, Richard A**
Soldier Performance Issues in C2 'On the Move' – 88
- Taylor, D. M.**
Method of Making an Ion Transport Membrane Oxygen Separation Device – 60
- Taylor, Ian**
AgentJ: Enabling Java NS-2 Simulations for Large Scale Distributed Multimedia Applications – 223
- Taylor, L. C.**
Effects of Artificial Gravity and Bed Rest on Spatial Orientation and Balance Control – 207
- Taylor, Robert**
Development of a Passively Deployed Roll-Out Solar Array – 9
- TeGrotenhius, W. E.**
Conditions for Fluid Separations in Microchannels, Capillary-Driven Fluid Separations, and Laminated Devices Capable of Separating Fluids – 116
- Terenzi, Michela**
Cognitive Aspects and Behavioral Effects of Transitions Between Levels of Automation – 208
- Terwilliger, T. C.**
Statistical Density Modification Using Local Pattern Matching – 215
- Tesche, T. W.**
Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- Teslich, N.**
SEM-EDS Analyses of Small Craters in Stardust Aluminum Foils: Implications for the Wild-2 Dust Distribution – 321
- Thayaparan, T**
Noise Radar Technology Basics – 118
- Thesken, John**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Thiebaut, Eric**
2006 Interferometry Imaging Beauty Contest – 118
- Thio, F.**
Investigation of Generation, Acceleration, Transport and Final Focusing of High-Intensity Heavy Ion Beams from Sources to Targets Final – 288
- Thomas, Jean-Philippe**
Mesoscale Modeling of the Recrystallization of Waspaloy and Application to the Simulation of the Ingot-Cogging Process (Preprint) – 65
- Thomas-Meyers, Gina**
The Role of Meta-Information in C2 Decision-Support Systems – 298
- Thompson, M. C.**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271
- Thompson, Sarah**
Dynamic Testing and Automatic Repair of Reconfigurable Wiring Harnesses – 25
- Thompson, Thomas L.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Thornton, Karen**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Thundat, T. G.**
Microcantilever Sensors for In-Situ Subsurface Characterization. 2006 ERSO Annual Report – 53
- Tillman, E. S.**
Use of Basic Polymers in Carbon Black Composite Vapor Detectors to Obtain Enhanced Sensitivity and Classification Performance for Volatile Fatty Acids – 40
- Tillotson, B. J.**
Virtual Pan/Tilt Camera System and Method for Vehicles – 98
- Timin, B.**
Meteorological Modeling for the Southern Appalachian Mountains Initiative (SAMI) – 154
- Toplis, M. J.**
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – 321
- Toporow, Chantal**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Tortora, P.**
Interiors of Enceladus and Rhea – 314
- Tossell, Chad**
Developing Expertise at the Operational-Level of Warfare – 297
- Tran, T.**
One Year Term Review as a Participating Guest in the Detonator and Detonation Physics Group – 268

- Trauger, John T.**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- Travish, G.**
UCLA/FNPL Underdense Plasma Lens Experiment: Results and Analysis – 274
Ultra-High Gradient Dielectric Wakefield Accelerator Experiments – 271
- Travnicek, P.**
Solar Wind Proton Temperature Anisotropy: Linear Theory and WIND/SWE Observations – 326
- Trent, J. W.**
Physics Analysis of a Gas Attenuator with Argon as a Working Gas – 269
- Treumiet, Joanne**
Dynamic Defensive Posture for Computer Network Defence – 234
- Trevino, Luis**
Space Suit Radiator Performance in Lunar and Mars Environments – 323
- Tripathy, S. K.**
Enzymatic Template Polymerization – 40
- Tromba, George E**
Operational Art for Space Control: Do the Principles of War Apply – 28
- Troy, Mitchell**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Tsakalakos, L.**
Elongated Nano-Structures and Related Devices – 37
- Tsaprazis, Konstantinos**
Design and Analysis of Side-Looking Sonar Experiments – 279
- Tucker, D. S.**
Vacuum Strength of Two Candidate Glasses for a Space Observatory – 60
- Tucker, Scot**
Net-Centric Pub/Sub Information Management Design for Command and Control – 225
- Turchi, John J**
Proteomic Analysis of Cisplatin-Resistant Ovarian Cancers – 173
- Turetsky, Vladimir**
Optimal Integration of Estimation and Guidance for Interceptors – 251
- Turner, Jason M**
The Communications of Influence through Technology-Enabled Media – 76
- Tynan, Peter**
Gauging U.S.-Indian Strategic Cooperation – 281
- Tysoe, A. A.**
High Temperature High Pressure Capsule for Processing Materials in Supercritical Fluids – 38
- Uchic, Michael D**
Modeling Plasticity of Ni3Al-Based L12 Intermetallic Single Crystals-I. Anomalous Temperature Dependence of the Flow Behavior (Preprint) – 58
- Uddin, N.**
Design and Analysis of Thermoplastic Composite Bridge Superstructures – 47
- Uitto, Jouni**
Molecular Characterization of Squamous Cell Carcinomas From Recessive Dysplastic Epidermolysis Bullosa – 194
- Ukoli, Flora A M**
Development of the Meharry Medical College Prostate Cancer Research Program – 191
- Um, Joon H**
Comparative Analysis of C2 Structures for Global Ballistic Missile Defense – 79
- Umeda, T.**
QCD Thermodynamics with $N(\text{sub } f)=2+1$ Near the Continuum Limit at Realistic Quark Masses – 275
Thermodynamics of $(2+1)$ -Flavor QCD – 270
- Undersander, Roy C**
Foreign Disclosure of Tactics: An Enabler to More Effective Coalition Operations – 305
- Ungar, Tamas H**
Slip Activity in Commercial Purity Titanium (CP Ti) – 64
- Ungaro, M.**
Single Pion Electroproduction in D(1232) and Roper Resonance Region With CLAS – 272
- Uri, John J.**
The International Space Station as a Research Laboratory: A View to 2010 and Beyond – 72
- Urrutia, Nicolas**
In Search of an Effective C2 Architecture for Counterinsurgency Operations: Lessons from the Colombian Experience – 83
- Vaartstra, B. A.**
Method for Making Sol Gel Spacers for Flat Panel Displays – 95
- Vachon, Paris W**
CoCoNaut Polarimetric SAR Signature Trial. Small Vessels of Opportunity Collections off Tofino, BC – 121
- Vaidya, U.**
Design and Analysis of Thermoplastic Composite Bridge Superstructures – 47
- Valdimarsdottir, Heiddis**
Genetic Factors in Breast Cancer: Center for Interdisciplinary Biobehavioral Research – 161
- Valles, Juan**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- van Dongeren, Ap**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Van Drogen, Audrey**
The Role of hCDC4 as a Tumor Suppressor Gene in Genomic Instability Underlying Prostate Cancer – 183
- Van Liew, H. D.**
A Start Toward Micronucleus-Based Decompression Models; Altitude Decompression – 200
- van Putten, F M**
Militaire Toepassingen Van Adaptieve Optiek (Military Applications of Adaptive Optics) – 120
- van Thiel de Vries, Jaap**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Van Winkle, D. H.**
Investigations of the Dynamics and Growth of Surfaces and Ultra Thin Films by Helium Atom Scattering – 290
- Vanderbei, Robert J.**
Toward 10(exp 10) Contrast for Terrestrial Exoplanet Detection: Demonstration of Wavefront Correction in a Shaped Pupil Coronagraph – 284
- vanderHulst, R. C.**
Psychological Operations: The Theory of Behavioral Influence – 205
- Vandermeij, Nancy**
The Cassini-Huygens Mission Overview – 311
- VanderWal, Randall L.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – 63
- Vanier, P. E.**
Directional Detection of a Neutron Source – 277
- Vann, R. D.**
Comparison of V-4 and V-5 Exercise/Oxygen Prebreathe Protocols to Support Extravehicular Activity in Microgravity – 201
- Vanwersch, R. A. P.**
Sleep and Alertness Management II: Effects on Sleep Pattern and Sleep Quality in Marmosets – 160
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance during the Late Evening, Night and Early Morning in Marmosets – 199
Sleep and Alertness Management – 200
- Vanwersch, R A**
Sleep and Alertness Management III: Effects of a Nap and Hypnotics on Performance During the Late Evening, Night and Early Morning in Marmosets – 202

- Varga, Denise M.**
Process Improvement in a Radically Changing Organization – 216
- Vary, J. P.**
From Non-Hermitian Effective Operators to Large-Scale No-Core Shell Model Calculations for Light Nuclei – 275
- Vaughan, Frank**
Initial Investigation on Fatigue in Command and Control Situation Awareness: Physiology and Cognitive Performance – 168
Situation Awareness and Fatigue Sensing – 203
- Vaughn, Jason**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288
- Vay, J. L.**
Simulating Electron Clouds in High-Current Ion Accelerators with Solenoid Focusing – 266
- Vayner, Boris V.**
NASA GRC and MSFC Space-Plasma Arc Testing Procedures – 288
- VBarnes, Christopher**
Modeling Performance in C4ISR Sustained Operations: A Multi-level Approach – 196
- Veazie, David**
Materials and Fabrication Methods for High Temperature Micro-Magnetic Machines for Micro-Turbine Power Generation – 139
- Vencel, Les**
A Network Centric Warfare (NCW) Compliance Process for Australian Defence – 238
- Verett, Marianna J**
Performance and Usage of Biometrics in a Testbed Environment for Tactical Purposes – 208
- Verma, Akhilesh**
Investigations into Novel Multi-Band Antenna Designs – 110
- Vertsimakha, Ya**
International Conference on Electronic Processes in Organic Materials (6th) Held in Gurzuf, Crimea, Ukraine, on September 25-29, 2006 – 42
- Vesper, Troy**
Reliability Information Analysis Center 1st Quarter 2007, Technical Area Task (TAT) Report – 294
- Veth, Michael**
Stochastic Constraints for Fast Image Correspondence Search with Uncertain Terrain Model – 22
- Veth, Mike**
Alignment and Calibration of Optical and Inertial Sensors Using Stellar Observations – 12
Fusion of Low-Cost Imaging and Inertial Sensors for Navigation – 12
- Two-Dimensional Stochastic Projections for Tight Integration of Optical and Inertial Sensors for Navigation – 12
- Vidonic, L. F.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Vieweg, Johannes**
Enhancement of Anti-Telomerase Immunity Against Prostate Cancer – 176
- Vijayalaxmi,**
JP-8 Jet Fuel: Genotoxic and Cytotoxic Studies in Experimental Animals – 173
- Visbal, Miguel R**
Multidisciplinary Computational Research – 251
- Vladimirova, Tanya**
A Low-Cost Femtosatellite to Enable Distributed Space Missions – 24
- Von Arx, Martin**
High Temperature Characterization of Ceramic Pressure Sensors – 120
- Vonheeder, Steven R**
Analysis and Tuning of a Low Cost Inertial Navigation System in the ARIES AUV – 11
- Wade, Katherine**
Index of International Publications in Aerospace Medicine – 205
- Wadsworth, J.**
c/a Ratio in Quenched Fe-C and Fe-N Steels - a Heuristic Story – 61
- Waem, A.**
Slutrapport foer Projekt KOMET (Final Report of the Project KOMET) – 88
- Waldman, J**
Polarimetric Backscattering Behavior of Ground Clutter at X, Ka, and W-band – 73
- Wallace, B**
Space-Based Observations of Satellites From the MOST Microsatellite – 25
- Wallace, James K.**
Astronomical Near-neighbor Detection with a Four-quadrant Phase Mask (FQPM) Coronagraph – 118
- Wallis, B.**
Cassini CIRS Observations of Thermal Differences in Saturn's Main Rings with Increasing Phase Angle – 313
- Walstra, Dirk-Jan**
XBeach Annual Report and Mode Description. Modeling of Hurricane Impacts – 223
- Walters, Robert**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Walther, John D**
Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58
- Wampler, Jeff**
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 209
- Wander, Joseph D**
Rigorous Mathematical Modeling of Adsorption System with Electrothermal Regeneration of the Used Adsorbent – 41
- Wang, Fen**
FGF Signaling and Dietary Factors in the Prostate – 175
- Wang, K. C. P.**
Automated Survey and Visual Database Development for Airport and Local Highway Pavement – 22
- Wang, Ten-See**
The Dynamics of Shock Dispersion and Interactions in Supersonic Freestreams with Counterflowing Jets – 117
- Wang, W I**
Stress-Engineered Quantum Dots for Multispectral Infra-Red Detector Arrays – 106
- Wang, X**
Innovative Methods for Engine Health Monitoring – 20
- Wang, Xiaoyan**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Warner, B. P.**
Electrochromic Salts Solutions and Devices – 51
- Warren, J. L.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – 320
- Watson, R. Kevin**
Micro-Inspector Avionics Module (MAM): A Self-Contained Low Power, Reconfigurable Avionics Platform for Small Spacecrafts and Instruments – 34
- Watson, Steve**
Sustainable, Reliable Mission-Systems Architecture – 242
- Watts, K. R.**
Hydrostratigraphic Framework of the Raton, Vermejo, and Trinidad Aquifers in the Raton Basin, Las Animas County, Colorado – 211
- Webb, Frank H.**
GPS – 134
- Webb, John**
Catalytic Degradation of Methylphosphonic Acid Using Iron Powder/Iron Oxides – 51
- Webb, Robert N**
Identifying Potential Implications of Technologies on Military and Security Operations – 261
- Weber, Jason D**
Role of the ARF Tumor Suppressor in Prostate Cancer – 172

- Wei, J.**
Acceleration Physics Code Web Repository – [237](#)
Beam Transport Lines for the BSNS – [291](#)
- Weigelt, Gerd P.**
2006 Interferometry Imaging Beauty Contest – [118](#)
- Weil, Shawn A**
A Methodology to Predict Specific Communication Themes from Overall Communication Volume for Individuals and Teams – [255](#)
Measuring Situational Awareness through Analysis of Communications: A Preliminary Exercise – [300](#)
PERSUADE: Modeling Framework for the Design of Modular Army Organizations – [224](#)
- Weinheimer, Andrew J.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – [133](#)
- Weinstein, J. J.**
Methods for Wireless Mesh Multicasting – [214](#)
- Weinstock, elliot M.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – [133](#)
- Weisgraber, T.**
Dynamic Simulation Tools for the Analysis and Optimization of Novel Collection, Filtration and Sample Presentation Systems – [113](#)
- Welch, Bryan W.**
Orbit Determination Analysis Utilizing Radiometric and Laser Ranging Measurements for GPS Orbit – [31](#)
- Welch, J.**
Apparatus and Process for Sensing Fluoro Species in Semiconductor Processing Systems – [45](#)
- Weld, K. R.**
Solving Cassini's Data Glitch Problem during Coherency Mode Transition for Titan Radar Observations – [77](#)
- Welsh, Jeffrey**
Development of a Passively Deployed Roll-Out Solar Array – [9](#)
- Wernik, C**
Noise Radar Technology Basics – [118](#)
- West, Bing**
Transforming the Structure of the Military: Combat Decisions -- Rank, Responsibility, or Frontline Position? – [89](#)
- Westmoreland, D. L.**
Method for Making Sol Gel Spacers for Flat Panel Displays – [95](#)
- Westphal, A. J.**
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – [320](#)
- Westphal, Andrew J.**
Discovery of Non-random Spatial Distribution of Impacts in the Stardust Cometary Collector – [317](#)
Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector – [149](#)
- White, Paul**
Review of Methods and Approaches for the Structural Risk Assessment of Aircraft – [15](#)
- Whitney, J. W.**
Geology, Water, and Wind in the Lower Helmand Basin, Southern Afghanistan – [152](#)
- Wiebe, Bob**
A System Dynamics Model of the Essential Tension Between Self-Synchronization and C2 – [301](#)
- Wiecek, Margaret M**
Generating Epsilon-Efficient Solutions in Multiobjective Programming – [250](#)
- Wiederhoef, Curt**
2nd ISS Treadmill Development 'T2 Project' – [207](#)
- Wilcox, Dwight R**
Sensor Ontology Integration for the Knowledge Management for Distributed-Tracking (KMDT) Program – [296](#)
- Wilkinson, Diana**
Assessment of Nuclear Medicine Capabilities in Responding to a Radiological Terrorism Event – [159](#)
- Williams, A. A.**
Traffic Engineering Applications of Driving Simulation – [211](#)
- Williams, Brian**
Practical Application of Model-based Programming and State-based Architecture to Space Missions – [220](#)
- Williams, David F.**
Results from an Investigation into Extravehicular Activity (EVA) Training related Shoulder Injuries – [204](#)
- Williams, David H.**
Crew Procedures for Continuous Descent Arrivals Using Conventional Guidance – [21](#)
- Williams, Jim**
Microgravity Effects on Combustion of Polymers – [69](#)
- Williams, K. W.**
Unmanned Aircraft Pilot Medical Certification Requirements – [205](#)
- Williams, Nancy I**
Effects of Moderate Aerobic Exercise Combined with Caloric Restriction on Circulating Estrogens and IGF-I in Pre-menopausal Women – [189](#)
- Williams, Skip**
A Microwave-Augmented Plasma Torch Module – [287](#)
Investigation of Kinetics of Iso-Octane Ignition Under Scramjet Conditions – [272](#)
Passive Optical Diagnostic of Xe-Propelled Hall Thrusters. I. Emission Cross Sections (Reprint) – [75](#)
- Wills, Craig D**
Airpower, Afghanistan, and the Future of Warfare: An Alternative View – [5](#)
- Wilson, Barbara M.**
Process Improvement in a Radically Changing Organization – [216](#)
- Wilson, J. W.**
Effect Of Spaceflight On Microbial Gene Expression And Virulence: Preliminary Results From Microbe Payload Flown On-Board STS-115 – [197](#)
- Wilson, Robert K.**
NASA's Spitzer Space Telescope's Operational Mission Experience – [314](#)
Spitzer Pre Launch Mission Operations System - The Road to Launch – [314](#)
- Wilton, D. R.**
Analysis of Thin Wires Using Higher-Order Elements and Basis Functions – [99](#)
- Wilton, Donald R.**
Simple and Efficient Numerical Evaluation of Near-Hypersingular Integrals – [250](#)
- Winzell, T.**
Multispektrala IR- & EO-Sensorer 2005 (Multispectral IR and E/O Sensors 2005) – [107](#)
- Wirz, Richard E.**
Analytical Ion Thruster Discharge Performance Model – [35](#)
- Wissler, Steven S.**
Deep Impact Sequence Planning Using Multi-Mission Adaptable Planning Tools With Integrated Spacecraft Models – [32](#)
- Witek, M.**
Boron-Doped Nanocrystalline Diamond – [96](#)
- Wodnicki, R. G.**
Integrated High Voltage Wswitching Circuit for Ultrasound Transducer Array – [96](#)
- Wofsy, Steven C.**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – [133](#)
- Wolcott, Michael P**
Durable Wood Composites for Naval Low-Rise Buildings – [49](#)

- Wolff, Charles L.**
Coupled Groups of g-Modes in a Sun with Mixed Core – 326
- Wollen, Mark**
Development and Optimization of a Tri-dyne Pressurization System for Pressure Fed Launch Vehicles – 28
- Wong, Carol**
Development and Use of a Web-based Automated Command Request Application in a Distributed Operations Environment for the Cassini Saturn Mission – 220
- Wong, Carolyn**
Facilitating Informed Decisionmaking: The E-DEL+I(trademark) Analytic Technique – 248
- Wong, Franklin C**
Radiation Dosimetry from Intratumoral Injection of Radionuclides in Human Breast Cancer – 169
- Wong, Kwok-Kin**
MPD in Telomerase Null Mice – 165
- Wong, L. L.**
Methods of Calculation of Resistance to Polarization (Corrosion Rate) Using ASTM G 59 – 53
- Wong, Leah**
Command World – 80
- Wong, S. S.**
Sidewall-Functionalized Carbon Nanotubes and Methods for making the Same – 66
- Wood, N**
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – 18
- Woods, Steve**
Defense Acquisitions: Air Force Decision to Include a Passenger and Cargo Capability in Its Replacement Refueling Aircraft Was Made Without Required Analyses – 18
- Wozniakiewicz, P. A.**
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction and Particle Location using Confocal Laser Scanning Microscopy – 320
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts – 320
- Wrest, D. J.**
System and Method for Corrosion Maintenance Scheduling – 62
- Wright, Jean**
Operational Thread Development: A Structured Approach to Capability Analysis – 225
- Wright, Jesse J.**
A Whale of a Tale: Creating Spacecraft Telemetry Data Analysis Products for the Deep Impact Mission – 219
- Wright, William**
Visible Battle Rhythm – 209
- Wu, Joseph M**
Cellular Targets of Dietary Polyphenol Resveratrol – 54
- Wu, Kinwah**
General Relativistic Radiative Transfer and General Relativistic MHD Simulations of Accretion and Outflows of Black Holes – 319
- Wu, N E**
Control Reconfiguration of Command and Control Systems – 92
- Wu, Xianping**
Prediction of Crystallographic Texture Evolution and Anisotropic Stress-Strain Curves During Large Plastic Strains in High Purity alpha-Titanium Using a Taylor-Type Crystal Plasticity Model (Preprint) – 290
- Wurster, Lindsey**
Environmental Sentinel Biomonitor (ESB) System Technology Assessment – 58
- Wytcherley, R. W.**
Purification of Carboxylic Acids by Complexation with Selective Solvents – 43
- Xie, Geoffrey**
A Software Framework for Mobile Ad Hoc Data Communications Using Voice-Centric Tactical Radios – 224
- Xing, Jing**
Reexamination of Color Vision Standards, Part 2. A Computational Method to Assess the Effect of Color Deficiencies in Using ATC Displays – 13
- Xu, H**
The Study of State-Selected Ion-Molecule Reactions using the Vacuum Ultraviolet Pulsed Field Ionization-Photoion Technique – 280
- Xue, Huifeng**
Modeling Intelligent C2 Using Technology of Multi-Agent – 83
- Xueref, Irene**
Transport in the Subtropical Lowermost Stratosphere during CRYSTAL-FACE – 133
- Yadama, Vikram**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Yakkala, A. P.**
Probe Sampling Strategies for Traffic Monitoring Systems Based on Wireless Location Technology – 77
- Yamada, K.**
Integer Programming Decoder for Machine Translation – 261
- Yan, H.**
Hole Transport Layer Compositions and Related Diode Devices – 95
- Yan, J.**
Ethernet Based Embedded System for FEL Diagnostics and Controls – 267
- Yan, Lok K**
Testing Agile Information Management Systems with Video Test Client. Case Study - DIMES – 302
- Yang, Han-Seung**
Durable Wood Composites for Naval Low-Rise Buildings – 49
- Yang, U.**
Improving Interpolation in BoomerAMG – 213
- Yantasee, W.**
Carbon Nanotube Nanoelectrode Arrays – 110
- Yaspan, Brian**
Identification and Characterization of an X-Linked Familial Prostate Cancer Gene – 168
- Yau, Bobby**
Investigations into Novel Multi-Band Antenna Designs – 110
- Ye,**
Control and Storage of Femtosecond Pulses via Passive Optical Cavities Ultrastable Ultrafast Lasers, Gain-Less Passive Amplifiers, and Ultrasensitive Wide-Bandwidth Laser Spectroscopy – 123
- Yeckel, C**
A Comparison of the AC Breakdown Strength of New and Used Poly A-Olefin Oil to Transformer Oil (Preprint) – 272
- Yen, A. S.**
Composition and Formation of the 'Paso Robles' Class Soils at Gusev Crater – 322
- Yoder, Tommy**
Stress Rupture Testing and Analysis of the NASA WSTF-JPL Carbon Overwrapped Pressure Vessels – 48
Testing of Full Scale Flight Qualified Kevlar Composite Overwrapped Pressure Vessels – 48
- Yoo, Henry**
Results from an International Measurement Round Robin of III-V Triple Junction Solar Cells under Air Mass Zero – 326
- Yoon, Yong K**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – 103
- Young, John S.**
2006 Interferometry Imaging Beauty Contest – 118
- Yu, Feili**
A Flexible Distributed Scheduling Scheme for Dynamic ESG Environments – 252
Model-Based Organization Analysis and Design for an ESG Organization – 258
- Yu, Huai-Te**
Experimental Investigation and Numerical Predication of a Cross-Flow Fan – 112

- Yu, Loon-Ng**
Short Message Service (SMS) Security Solution for Mobile Devices – [228](#)
- Zabinski, Jeffrey S.**
Wear Behavior of Low-Cost, Lightweight TiC/Ti-6Al-4V Composite Under Fretting: Effectiveness of Solid-Film Lubricant Counterparts – [63](#)
- Zabinsky, Jr , Jeffrey S**
Patterning of Biomolecules on Plasma-Enhanced Chemical Vapor Deposited Generated Surfaces – [41](#)
- Zachara, J. M.**
Microscopic Controls on the Desorption/Dissolution of Sorbid U(VI) and Their and Influence on Reactive and Transport. 2006 ERSD Annual Report – [53](#)
- Zacharias, N**
Very Large Array Plus Pie Town Astrometry of 46 Radio Stars – [316](#)
- Zaidi, Abbas K**
On Applying Point-Interval Logic to Criminal Forensics (Student Paper) – [264](#)
- Zakowski, Sandra G**
Improving Quality of Life in Ovarian Cancer Patients: A Brief Intervention for Patients and Their Partners – [166](#)
- Zaman, M. F.**
High-Resolution In-Plane Tuning Fork Gyroscope and methods of Fabrication – [125](#)
- Zana, I**
Magnetic Patterning of Permanent-Magnet Rotors for Microscale Motor/Generators – [139](#)
- Zana, Iulica**
Magnetic Induction Machines Integrated into Bulk-Micromachined Silicon – [56](#)
- Zaslavsky, A**
Phonon Enhancement of Electronic and Optoelectronic Devices – [105](#)
- Zebulum, Ricardo S.**
Temperature-Adaptive Circuits on Reconfigurable Analog Arrays – [100](#)
- Zetterberg, L.**
Greenhouse Gas Emissions Trading for the Transport Sector – [148](#)
- Zhang, Bing**
A Magnetohydrodynamic Boost for Relativistic Jets – [116](#)
- Zhang, Chendi**
XNsim: Internet-Enabled Collaborative Distributed Simulation via an Extensible Network – [244](#)
- Zhang, Chu**
Function of Periecan Domain 1 in Prostate Cancer – [163](#)
- Zhang, Jingxian**
Targeting Stromal Recruitment by Prostate Cancer Cells – [173](#)
- Zhang, L.**
Methods for Producing and using Catalytic Substrates for Carbon Nanotube Growth – [265](#)
- Zhang, S. W.**
Emissive Sensors and Devices Incorporating These Sensors – [96](#)
- Zhao, G.**
Nondestructive Evaluation of Thermal Spray Coating Interface Quality by Eddy Current Method – [67](#)
- Zhao, Q.**
Phantom for Production of Controllable fMRI Signal – [97](#)
- Zhao, Qunhua**
Intent Driven Adversarial Modeling – [261](#)
- Zhao, Zhiyong**
Low-Voltage Ferroelectric Phase Shifters From L- to C-Band – [103](#)
- Zheng, Will Hua**
Catastrophic Fault Recovery with Self-Reconfigurable Chips – [215](#)
- Zhou, Qun**
Antineoplastic Efficacy of Novel Polyamine Analogues in Human Breast Cancer – [67](#)
- Zielińska, B.**
Chemical Analysis of Lubrication Oil Samples from a Study to Characterize Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area – [39](#)
- Zimmer, P. C.**
Surface Layer Atmospheric Turbulence Differential Image Motion Measurement – [313](#)
- Zimmerman, Carl**
The USAF Installation Control Center (ICC) – [90](#)
- Zimmermann, F.**
Accelerator Physics Code Web Repository – [268](#)
- Zingoni, F.**
Interiors of Enceladus and Rhea – [314](#)
- Zolensky, M. E.**
A New Modal Analysis Method to put Constraints on the Aqueous Alteration of CR Chondrites and Estimate the Unaltered CR Composition – [150](#)
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community – [320](#)
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling – [321](#)
- Zolesi, Bruno**
European Upper Atmosphere Server DIAS - Final Conference/ Abstract – [318](#)
- Zoughi, R**
Comparison of X-Ray, Millimeter Wave, Shearography and Through-Transmission Ultrasonic Methods for Inspection of Honeycomb Composites (Preprint) – [130](#)
Fusion of Microwave and Eddy Current Data for a Multi-Modal Approach in Evaluating Corrosion Under Paint and in Lap Joints (Preprint) – [18](#)
- Zwart, S. R.**
Artificial Gravity as a Bone Loss Countermeasure in Simulated Weightlessness – [206](#)
Nutritional Status Assessment (SMO 016E) – [203](#)