



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

**Scientific and Technical
Information Program Office**

Scientific and Technical Aerospace Reports

STAR

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	3
04	Aircraft Communications and Navigation	4
05	Aircraft Design, Testing and Performance	5
06	Avionics and Aircraft Instrumentation	11
07	Aircraft Propulsion and Power	12
08	Aircraft Stability and Control	12
09	Research and Support Facilities (Air)	13

Astronautics

12	Astronautics (General)	13
14	Ground Support Systems and Facilities (Space)	14
15	Launch Vehicles and Launch Operations	15
16	Space Transportation and Safety	18
17	Space Communications, Spacecraft Communications, Command and Tracking	19
18	Spacecraft Design, Testing and Performance	19
19	Spacecraft Instrumentation and Astrionics	22
20	Spacecraft Propulsion and Power	23

Chemistry and Materials

24	Composite Materials	24
25	Inorganic, Organic and Physical Chemistry	26
26	Metals and Metallic Materials	31
27	Nonmetallic Materials	33
28	Propellants and Fuels	35
29	Space Processing	36

Engineering

31	Engineering (General)	36
32	Communications and Radar	49
33	Electronics and Electrical Engineering	61
34	Fluid Mechanics and Thermodynamics	69
35	Instrumentation and Photography	69
36	Lasers and Masers	73

37	Mechanical Engineering	74
38	Quality Assurance and Reliability	76
39	Structural Mechanics	76

Geosciences

42	Geosciences (General)	77
43	Earth Resources and Remote Sensing	79
44	Energy Production and Conversion	81
45	Environment Pollution	81
46	Geophysics	82
47	Meteorology and Climatology	86

Life Sciences

51	Life Sciences (General)	88
52	Aerospace Medicine	105
53	Behavioral Sciences	124
54	Man/System Technology and Life Support	145

Mathematical and Computer Sciences

59	Mathematical and Computer Sciences (General)	149
60	Computer Operations and Hardware	152
61	Computer Programming and Software	153
62	Computer Systems	160
63	Cybernetics, Artificial Intelligence and Robotics	162
64	Numerical Analysis	166
65	Statistics and Probability	168
66	Systems Analysis and Operations Research	168

Physics

70	Physics (General)	171
71	Acoustics	172
72	Atomic and Molecular Physics	173
73	Nuclear Physics	174
74	Optics	175
76	Solid-State Physics	176

Social and Information Sciences

80	Social and Information Sciences (General)	176
81	Administration and Management	177
82	Documentation and Information Science	178

Space Sciences

88	Space Sciences (General)	184
90	Astrophysics	186
91	Lunar and Planetary Science and Exploration	189
93	Space Radiation	197

General

99	General	198
----	-------------------------	-----

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 46, NUMBER 05

MARCH 17, 2008

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.

20080009703 NASA Dryden Flight Research Center, Edwards, CA, USA

Autonomous Formation Flight: Project Overview

Cole, Jennifer; Cobleigh, Brent; Vachon, Jake; Ray, Ronald J.; Ennix, Kimberly; Walsh, Kevin; February 08, 2008; 21 pp.; In English; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080009703>

Objectives: a) Map the vortex effects; b) Formation Auto-Pilot Requirements. Two NASA F/A-18 aircraft in formation: a) NASA 845 Systems Research Aircraft; b) NASA 847 Support Aircraft. Flight Conditions: M = 0.56, 25000 feet (Subsonic condition); b) M = 0.86, 36000 feet (Transonic condition). Nose-To-Tail (N2T) Distances: 20, 55, 110 and 190 feet. Lessons learned: a) Controllable flight in vortex is possible with pilot feedback (displays); b) Position hold at best C(sub D), is attainable; c) Best drag location is close to max rolling moment; e) Drag reductions demonstrated up to 22% (WFE up to 20%); f) Induced drag results compare favorably with simple prediction model; g) 'Sweet Spot' (lateral & vertical area > 25%) is larger than predicted; h) Larger wing overlaps result in sign reversals in roll, yaw; i) As predicted, favorable effects degrade gradually with increased nose-to-tail distances after peaking at 3 span lengths aft; and j) Demonstrated - over 100 N mi (>15%) range improvement and 650 lbs (14%) fuel savings on actual simulated F/A-18 cruise mission.

Derived from text

Automatic Pilots; Research Aircraft; Vortices; Formation Flying; Induced Drag; Yaw; Autonomy

20080010689 ITT Corp., Herndon, VA, USA

Additional Technologies and Investigations for Provision of Future Aeronautical Communications

Gilbert, Tricia; Jin, Jenny; Berger, Jason; Henriksen, Steve; February 2008; 95 pp.; In English; Aeronautics Communications Panel (ACP), Working Group T-1, 19-21 Sep. 2007, Montreal, Canada; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNC05CA85C; SAA3-426; WBS 561581.02.08.03.11.01

Report No.(s): NASA/CR-2008-214987; E-16183; WP13; No Copyright; Avail.: CASI: [A05](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010689>

The following NASA Contractor Report documents the in-depth studies on select technologies that could support long-term aeronautical mobile communications operating concepts. This work was performed during the third and final phase of NASA's Technology Assessment for the Federal Aviation Administration (FAA)/EUROCONTROL Future Communications Study (FCS) under a multiyear NASA contract. It includes the associated findings of ITT Corporation and NASA Glenn Research Center to the FAA as of the end of May 2007. The activities documented in this report focus on three final technology candidates identified by the USA, and were completed before sufficient information about two additional technology candidates proposed by EUROCONTROL was made available. A separate report to be published by NASA/CR-2008-215144, entitled Final Report on Technology Investigations for Provision of Future Aeronautical Communications will include an assessment of all five final candidate technologies considered by the U.S. agencies (FAA and NASA) and EUROCONTROL. It will also provide an overview of the entire technology assessment process, including final recommendations. All three

phases of this work were performed in compliance with the Terms of Reference for the Action Plan number 17 (AP-17) cooperative research agreement among EUROCONTROL, FAA, and NASA along with the general guidance of the FAA and EUROCONTROL available throughout this study.

Author

Technology Assessment; Aeronautics; Aircraft Communication; Air Traffic Control; Communication Networks

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.

20080010709 Dayton Univ., OH USA

Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint)

Inoyam, Daisaku; Sanders, Brian P; Joo, James J; Dec 2007; 12 pp.; In English

Contract(s)/Grant(s): Proj-A03Q

Report No.(s): AD-A475644; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper presents a novel topology optimization methodology for a synthesis of distributed actuation systems with specific applications to morphing air vehicle structures. The main emphasis is placed on the topology optimization problem formulation and the development of computational modeling concepts. The analysis model is developed to meet several important criteria: It must allow a large rigid-body displacement, as well as a variation in planform area, with minimum strain on structural members while retaining acceptable numerical stability for finite element analysis. For demonstration purposes, the in-plane morphing wing model is presented. Topology optimization is performed on a semiground structure with design variables that control the system configuration. In other words, the state of each element in the model is controlled by a corresponding design variable that, in turn, is determined through the optimization process. In effect, the optimization process assigns morphing members as soft elements, nonmorphing load-bearing members as stiff elements, and nonexistent members as 'voids.' The optimization process also determines the optimum actuator placement, where each actuator is represented computationally by equal and opposite nodal forces with soft axial stiffness. Sample in-plane morphing problems are solved to demonstrate the potential capability of the methodology.

DTIC

Actuators; Aircraft Models; Asymptotes; Convergence; Optimization; Topology; Variable Sweep Wings; Wings

20080010774 Aeroprediction, Inc., King George, VA USA

The 2009 Version of the Aeroprediction Code: The AP09

Moore, Frank G; Moore, Linda Y; Jan 2008; 135 pp.; In English

Report No.(s): AD-A475563; API-08/03; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The AP05 code was evaluated when applied to configurations with boattails. Results of the evaluation indicated the AP05 predictions for normal force, center of pressure, pitch and roll damping moments needed improvement. As a result new and improved methods were developed and incorporated into the AP05 to be released as the AP09. Improvements include body alone lift characteristics for Mach numbers less than 2, low angle of attack improvements for roll and pitch damping for configurations with long boattails, incorporation of an improved boundary layer displacement model and refinement of several other existing methods. In addition, new methods were developed to predict nonlinear roll and pitch damping. Comparing the new and improved methods to existing experimental data indicated significant improvements in roll and pitch damping, normal force and center of pressure predictions compared to the AP05. However, validation of the AP09 code was not as complete as desired due to limited generic nonlinear roll and pitch damping data. Also, most of the available nonlinear dynamic derivative data has larger than desired accuracy boundaries due to model sting and wind tunnel wall interference issues. Weapons affected most by the new AP09 methodology are mortars, low drag bombs and projectiles in that order. However, the nonlinear dynamic derivative predictions affect all weapons. The AP09 is thus the most accurate and robust of the Aeroprediction Codes to date.

DTIC

Weapons; Computation; Predictions; Configurations; Mortars (Material)

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.

20080009658 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

Development of an Aeromedical Scientific Information System for Aviation Safety

Peterman, Connie L.; Rogers, Paul B.; Veronneau, Stephen J. H.; Whinnery, James E.; January 2008; 20 pp.; In English; Original contains black and white illustrations

Report No.(s): DOT/FAA/AM-08/1; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A Scientific Information System (SIS) is defined as a computerized Management Information System that takes a systems viewpoint and is based on scientific principles of theory construction, data quality, and systematic data analysis (Holt, 2001). The Bioinformatics Research Team created a SIS to deal with the increasingly large government observational datasets on aviation mishaps (incidents and accidents) and airman pilot and medical certifications while incorporating system safety principles. This paper will describe the creation of the SIS which is a permanent epidemiological database designed exclusively for aviation research. A knowledge discovery process was developed to consolidate different aviation data sources into a single dataset with a format more conducive to statistical analysis. This process involved selection, preprocessing, transformation, data mining, and evaluation of many different data sources (Dunham, 2003). The ultimate goal of a SIS is to be able to explain, predict, and precisely control the processes and outcomes of complex systems (Holt, 2001). One benefit of our SIS is that it will support epidemiological researchers in aviation safety studies who are not familiar with the underlying process of the dataflow, collection, and storage. This system will support studies undertaken that examine the aviation safety and aeromedical aspects of certifying pilots with various pathological conditions.

Derived from text

Aircraft Safety; Management Information Systems; Pilot Performance; Aircraft Accidents; Research

20080009952 Air Command and Staff Coll., Maxwell AFB, AL USA

Coercive Airpower in the Twenty First Century

Mineau, David A; Apr 2006; 34 pp.; In English

Report No.(s): AD-A475487; AU/ACSC/4212/AY06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The classical airpower theorists promoted air forces as a revolutionary new combat and capable of destroying the moral resistance of the enemy. Speaking about the effects of aerial bombardment, Giulio Douhet said, 'A complete breakdown of the social structure cannot but take place in a country subjected to this kind of merciless pounding from the aft. The time would soon come when, driven by the instinct of self-preservation, would rise up and demand an end to the war.' Douhet and others focused on crushing the enemy's will to fight through direct attack on civilian populations. These early theorists developed their ideas in the aftermath of WWI, when operations were not constrained over fears of collateral damage or force protection. Leading up to WWII, American airpower theorists expanded strategic air attack to include destroying the opponent's material war making capacity. During WWII and the Cold War, airpower's primary mission was touted as strategic bombing with two intertwined targets: military-economic capacity and civilian populations.

DTIC

Coercivity

20080009983 Embry-Riddle Aeronautical Univ., Daytona Beach, FL USA

Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training

Rogers, Rodney O; Boquet, Albert; Howell, Cass; DeJohn, Charles; Oct 2007; 24 pp.; In English

Report No.(s): AD-A475565; DOT/FAA/AM-07/27; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Many air transport training programs provide simulator-based upset-recovery instruction for company pilots. However, no research exists to demonstrate that such training transfers to an airplane in flight. We report on an in-progress FAA-funded research experiment to evaluate upset-recovery training transfer. Participant pilots are trained using low-cost desktop flight simulation, then subjected to serious in-flight upsets in an aerobatic airplane. Preliminary results comparing the performance of trained and control group pilots suggest that simulator-based training may improve a pilot's ability to recover an airplane from an upset. We summarize prior research, describe the experiment, and present results of Phase-One testing. We also detail

planned refinements in Phase-Two flight training and testing that we hope will strengthen the results of our research. Although we are conducting flight testing in a general aviation airplane, our research has important implications for heavy aircraft upset recovery trainers.

DTIC

Education; Flight Simulators; Low Cost; Simulators

20080009999 Federal Aviation Administration, Oklahoma City, OK USA

Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006

Botch, Sabra R; Johnson, Robert D; Oct 2007; 16 pp.; In English

Report No.(s): AD-A475599; DOT/FAA/AM-07/29; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Many drugs commonly used for the treatment of various ailments can be dangerous when used in combination. Antiemetics and sedatives are two drug classes that contain compounds that may have harmful side effects when mixed. A drug such as chlorpheniramine with antiemetic properties can dramatically increase the negative side effects of numerous drugs in the sedative class. This phenomenon is especially dangerous for pilots. Although many of these compounds are considered disqualifying and are not allowed by the FAA, their use does occur in the pilot community. Pilots that use these drugs may be unaware of the danger that can arise when compounds from these two drug classes are taken together. Our laboratory was interested in evaluating the circumstances surrounding accidents in which the pilot was found positive for drugs from each of these two classes. Epidemiological, toxicological, and aeromedical findings from pilots involved in such accidents were collected for a 7-year period, 2000 - 2006. Case histories, accident information, and the probable cause of the aviation accidents were obtained from the National Transportation Safety Board (NTSB). Toxicological information was obtained from the Civil Aerospace Medical Institute's (CAMI's) Forensic Toxicology Research Laboratory. There were 2,184 fatal aviation accidents over this time period. Of these accidents, 26 were found positive for compounds from both the antiemetic and the sedative drug classes. All 26 aircraft were operated under 14 CFR Part 91 as general aviation. All pilots involved in these accidents were male; 21 tested positive for a disqualifying substance that may have affected their ability to control the aircraft.

DTIC

Antiemetics and Antinauseants; Civil Aviation; Drugs; Pilots; Sedatives

04

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.

20080009779 NASA Langley Research Center, Hampton, VA, USA

Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers

Nguyen, Truong X.; Mielnik, John J.; February 2008; 34 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DFTA03-96-X-90001; WBS 645846.02.07.07.05

Report No.(s): NASA/TP-2008-215111; L-19434; Copyright; Avail.: CASI: A03, Hardcopy

A process is demonstrated to show compatibility between a radio frequency identification (RFID) tag and an aircraft glideslope (GS) radio receiver. The particular tag chosen was previously shown to have significant spurious emission levels that exceeded the emission limit in the GS aeronautical band. The spurious emissions are emulated in the study by capturing the RFID fundamental transmission and playing back the signal in the GS band. The signal capturing and playback are achieved with a vector signal generator and a spectrum analyzer that can output the in-phase and quadrature components (IQ). The simulated interference signal is combined with a GS signal before being injected into a GS receiver's antenna port for interference threshold determination. Minimum desired propagation loss values to avoid interference are then computed and compared against actual propagation losses for several aircraft.

Author

Compatibility; Radio Frequencies; Aircraft Instruments; Radio Frequency Interference

20080010001 Federal Aviation Administration, Cambridge, MA USA

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study

Nadler, E; Yost, A; Kendra, A; Dec 2007; 44 pp.; In English

Report No.(s): AD-A475604; DOT/FAA/AM-07/30; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A flight experiment was conducted to assess human factors issues associated with pilot use of traffic displays for approach

spacing. Sixteen multi-engine rated pilots participated. Eight flew approaches in a twin-engine Piper Aztec originating in Sanford, ME, and eight flew approaches in the same aircraft originating in Atlantic City, NJ. The spacing target was a Cessna 206. The traffic display was either a Garmin International MX-20 (the 'Basic' Cockpit Display of Traffic Information, or CDTI) or an MX-20 modified with features to help the pilot monitor the closing rate, the range and ground speed of the traffic-to-follow, and ownship ground speed (Range Monitor). Two other Equipment conditions were Baseline and Autopilot. Pilots successfully used the displays to maintain the assigned spacing on visual and instrument approaches. The spacing deviations were significantly lower when using the displays during visual approaches than when attempting to maintain spacing without a traffic display. The mean spacing deviation during the IFR approaches was less than 0.10 NM for all three equipment conditions (Basic CDTI, Range Monitor, Autopilot), and these mean spacing deviations did not differ significantly. Range Monitor features appeared to particularly benefit the low-hour pilots. While the traffic display reduced visual reacquisition times, this effect was only found with pilots whose displays showed additional traffic (not only the traffic-to-follow). In general, however, the additional traffic was associated with less time between fixations on the display and higher workload. Subjects appeared to have had difficulty identifying an optimal display range that would simultaneously provide traffic awareness and spacing task performance.

DTIC

Air Traffic Control; Aviation Psychology; Display Devices; General Aviation Aircraft; Human Factors Engineering; Traffic

20080010686 ITT Corp., Herndon, VA, USA

Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements

Henriksen, Steve; February 2008; 56 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNC05CA85C; WBS 561581.02.08.03.11.01

Report No.(s): NASA/CR-2008-214841; E-16057; No Copyright; Avail.: CASI: A04, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010686>

There are significant activities taking place to establish the procedures and requirements for safe and routine operation of unmanned aircraft systems (UAS) in the National Airspace System (NAS). Among the barriers to overcome in achieving this goal is the lack of sufficient frequency spectrum necessary for the UAS control and air traffic control (ATC) communications links. This shortcoming is compounded by the fact that the UAS control communications links will likely be required to operate in protected frequency spectrum, just as ATC communications links are, because they relate to 'safety and regularity of flight.' To support future International Telecommunications Union (ITU) World Radio Conference (WRC) agenda items concerning new frequency allocations for UAS communications links, and to augment the Future Communications Study (FCS) Technology Evaluation Group efforts, NASA Glenn Research Center has sponsored a task to estimate the UAS control and ATC communications bandwidth requirements for safe, reliable, and routine operation of UAS in the NAS. This report describes the process and results of that task. The study focused on long-term bandwidth requirements for UAS approximately through 2030.

Author

Aircraft Safety; Pilotless Aircraft; Air Traffic Control; Communication Networks; National Airspace System; Unmanned Aircraft Systems

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.

20080009620 NASA Dryden Flight Research Center, Edwards, CA, USA

Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft

Cobleigh, Brent; Hansen, Jennifer; Vachon, Jake; Fullerton, Gordon; February 08, 2008; 2 pp.; In English; Original contains color illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009620>

A general overview of the vortex induced performance benefits of Dryden's DC-8 and F-18 trail aircraft is shown. The status of the mission and safety hazards are also presented.

CASI

F-18 Aircraft; General Overviews; Vortices; Formation Flying; DC 8 Aircraft

20080009777 NASA Langley Research Center, Hampton, VA, USA; Purdue Univ., West Lafayette, IN, USA
Modeling and Optimization for Morphing Wing Concept Generation II, Part 1, Morphing Wing Modeling and Structural Sizing Techniques

Skillen, Michael D.; Crossley, William A.; February 2008; 45 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNL06AA04G; WBS 659877.02.07.05.9S51.02

Report No.(s): NASA/CR-2008-214902/PT1; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009777>

This report documents a series of investigations to develop an approach for structural sizing of various morphing wing concepts. For the purposes of this report, a morphing wing is one whose planform can make significant shape changes in flight - increasing wing area by 50% or more from the lowest possible area, changing sweep 30 or more, and / or increasing aspect ratio by as much as 200% from the lowest possible value. These significant changes in geometry mean that the underlying load-bearing structure changes geometry. While most finite element analysis packages provide some sort of structural optimization capability, these codes are not amenable to making significant changes in the stiffness matrix to reflect the large morphing wing planform changes. The investigations presented here use a finite element code capable of aeroelastic analysis in three different optimization approaches - a 'simultaneous analysis' approach, a 'sequential' approach, and an 'aggregate' approach.

Author

Aeroelasticity; Wings; Aircraft Design; Wing Planforms; Shapes; Morphology; Shape Optimization; Structural Design; Airfoil Profiles

20080009778 NASA Langley Research Center, Hampton, VA, USA; Purdue Univ., West Lafayette, IN, USA
Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II, Part 2, Morphing Aircraft Sizing via Multi-level Optimization

Skillen, Michael D.; Crossley, William A.; February 2008; 2 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NNL06AA04G; WBS 659877.02.07.05.9S51.02

Report No.(s): NASA/CR-2008-214903/PT2; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009778>

This report presents an approach for sizing of a morphing aircraft based upon a multi-level design optimization approach. For this effort, a morphing wing is one whose planform can make significant shape changes in flight - increasing wing area by 50% or more from the lowest possible area, changing sweep 30 or more, and/or increasing aspect ratio by as much as 200% from the lowest possible value. The top-level optimization problem seeks to minimize the gross weight of the aircraft by determining a set of 'baseline' variables - these are common aircraft sizing variables, along with a set of 'morphing limit' variables - these describe the maximum shape change for a particular morphing strategy. The sub-level optimization problems represent each segment in the morphing aircraft's design mission; here, each sub-level optimizer minimizes fuel consumed during each mission segment by changing the wing planform within the bounds set by the baseline and morphing limit variables from the top-level problem.

Author

Shapes; Wing Planforms; Wings; Shape Optimization; Structural Design; Morphology; Body-Wing Configurations; Wing Profiles; Airfoil Profiles

20080009882 Damos Aviation Services, Inc., Gurnee, IL USA
Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data

Damos, Diane L; Gould, R B; Sep 2007; 53 pp.; In English

Contract(s)/Grant(s): DASW01-03-D-0016; Proj-A792

Report No.(s): AD-A475416; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475416>

The U.S. Army's aviator candidate pool, unlike the pools for the U.S. Air Force (USAF) and U.S. Navy (USN), includes military enlisted personnel and civilians, many of whom do not have a 4-year college degree. Existing tests, such as the Air Force Officer Qualifying Test (AFOQT), may be too difficult for a substantial subset of Army aviator candidates, failing to produce a sufficient spread of scores at selection points. The analyses evaluated the difficulty of the AFOQT for a sample of USAF personnel that should be similar in education to the U.S. Army aviator applicant populations. The analyses compared score distributions of the AFOQT subtest and composite scores for different sample sources. The AFOQT was more difficult

for the Air Force enlisted personnel than for other commissioning source applicants. However, the subtest and composite score distributions are sufficient to discriminate well between enlisted personnel if the AFOQT or a similar aptitude test is used for selection. On the highly timed subtests of the Pilot Composite, such as the Instrument Comprehension and Table Reading tests, there is almost no difference between the examinee subpopulations.

DTIC

Helicopters; Pilot Selection; Pilots

20080009890 Concordia Univ., Montreal, Quebec Canada

Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems

Khorasani, K; Mar 30, 2007; 238 pp.; In English

Contract(s)/Grant(s): W7701-052053/001/QCL; Proj-13JZ03

Report No.(s): AD-A475438; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475438>

In order to avoid adverse consequences due to failures, it is desirable to have an advanced failure detection and isolation (FDI) system that detects and identifies anomalies early to minimize the damage, and that can remedy as many failures as possible. In complex systems, fault diagnosis is typically accomplished using a hierarchical approach. In our proposed autonomous unmanned vehicle (UAV) system, fault diagnosis, isolation and recovery (FDIR) is accomplished by using a hierarchical and decentralized approach. At this level of the hierarchy the model based or analytical redundancy based approach to FDIR would require a mathematical model of the process or sub-process under consideration. Based on this knowledge quantities called residuals will be generated. The residuals should be small or close to zero when there are no failures in the system. On the other hand, they should become nonzero and grow large if there are malfunctions in the system. This will accomplish the failure detection. The next important task will be the design of a fault isolation module that would isolate the faulty components or subsystems. There are two major approaches to the design and implementation of recovery procedures. One is to synthesize the procedures for every possible failure mode at the design stage. Once the diagnostic and recovery system is activated, it monitors the system and if it detects a failure, then the system will initiate the appropriate recovery procedure. In the other approach, suitable recovery procedures are generated 'on-line' upon the detection of failures. In this report, we will examine the advantages and drawbacks of the above approaches in our framework.

DTIC

Detection; Fault Detection; Isolation; Mathematical Models

20080009892 North Dakota State Univ., Fargo, ND USA

Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance

Bierwagen, Gordon; Croll, Stuart; Webster, Dean; Tallman, Dennis; Huo, Qun; Allahar, Brian; Su, Quan; Bonitz, Verena; Fernando, Dilhan; Wang, Duhua; Dec 20, 2007; 10 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0368

Report No.(s): AD-A475443; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475443>

The report presents research that addresses research performed at NDSU for environmentally compliant corrosion protection in coatings systems of greatly extended lifetimes for present and future aircraft. For present coatings system, this work included modeling degradation in the bulk of a coating by the Monte Carlo methods developed in this laboratory for coating surface degradation, to test its applicability to the prediction of the lifetime of corrosion protection in coatings. Also work was performed to improve the analysis of the dielectric properties of organic coatings by the use of EIS, focusing on the higher frequency parts of the EIS spectrum dominated by these properties.

DTIC

Aircraft; Aluminum Alloys; Corrosion; Corrosion Prevention; Protective Coatings

20080009893 Texas A&M Univ., College Station, TX USA

Physics-Based Aeroelastic Analysis for Future Air Vehicle Concepts Using a Fully Nonlinear Methodology

Strganac, Thomas W; Jun 30, 2007; 18 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0174

Report No.(s): AD-A475444; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475444>

Future air vehicles will be highly flexible and will include deformable sub-systems resulting in new physical interactions

between a vehicle's structure, the surrounding flowfield, and the dynamics of the vehicle that are fundamentally nonlinear. Although existing aeroelastic methodologies might be considered reliable for traditional applications, they fail (as evidenced by current experiences) to properly capture the complex physics expected for these vehicles. Challenges include non-traditional and time-varying geometries, separated flows, nonlinear dynamic vehicle states, and high-fidelity modeling requirements for highly integrated vehicles. In short, there are no means for understanding the basic interactions that occur in systems dominated by nonlinearities in all three disciplines -structure, flow, and dynamics, nor are the computational interfaces adequate to handle the nonlinear interdisciplinary interactions.

DTIC

Aeroelasticity; Nonlinear Systems; Nonlinearity

20080009981 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems

Dullerud, Geir E; Bullo, Francesco; Feron, Eric; Frazzoli, Emilio; Kumar, P R; Lall, Sanjay; Liberzon, Daniel; Lynch, Nancy A; Mitchell, John C; Mitter, Sanjoy K; Dec 28, 2007; 61 pp.; In English

Contract(s)/Grant(s): F49620-02-1-0325

Report No.(s): AD-A475560; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of this MURI center was the development of a rigorous theoretical foundation, and scalable analytical tools and paradigms for construction of networked control for large numbers of autonomous and semi-autonomous air vehicles. The research is specifically aimed at the critical reliability and performance issues facing autonomous vehicle systems which operate in highly uncertain environments, and enables the vehicles to form teams, manage information, and coordinate operations including deployment, task allocation and search. The program produced both the fundamental theory necessary to allow systematic performance analysis, verification and validation of such systems, as well as algorithms for implementation, and design software.

DTIC

Networks; Remotely Piloted Vehicles

20080009988 Civil Aeromedical Inst., Oklahoma City, OK USA

An International Survey of Maintenance Human Factors Programs

Hackworth, Carla; Holcomb, Kali; Dennis, Melanie; Goldman, Scott; Bates, Cristina; Schroeder, David; Johnson, William; Sep 2007; 32 pp.; In English

Report No.(s): AD-A475576; No Copyright; Avail.: Defense Technical Information Center (DTIC)

There are many international approaches to the regulation of human factors programs for aviation maintenance organizations. Transport Canada and the European Aviation Safety Agency have established specific regulations regarding maintenance human factors. The Federal Aviation Administration has not yet established regulations but, instead, has created guidance documents and developed voluntary reporting programs for maintenance organizations. The purpose of this study was to assess the status of human factors programs in airline maintenance organizations and independent maintenance and repair organizations. Questions focused on training, error management, fatigue management, and other human factors issues. An online link was sent via E-mail to 630 addresses. Of these, 414 respondents returned a valid questionnaire (i.e., defined as responding to at least one content item), which resulted in a response rate of 66%. A highly-experienced group (i.e., over 65% had 20 years in aviation maintenance) from more than 50 countries responded to the questionnaire. Results highlight the maintenance human factors strategies, methods, and programs that companies use to reduce human error.

DTIC

Aircraft Maintenance; Errors; Human Factors Engineering; Human Performance; Maintenance; Personnel; Policies; Surveys

20080010006 Army Command and General Staff Coll., Fort Leavenworth, KS USA

Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment

Farrar, Brian M; Dec 14, 2007; 107 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475630; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The USA Air Force (USAF) has developed the ability to strike newly detected targets within minutes by pre-positioning aircraft near potential targets. This 'dynamic targeting' process provides responsiveness and flexibility, but it also has limitations. In order to strike a newly emerged target, an appropriately armed aircraft must be available to provide the desired effects. Such availability requires loitering, and limited fuel access could severely restrict loiter time near potential target areas.

Faced with such limitations, commanders desire maximum airborne presence of suitably equipped aircraft to hold targets at risk--in other words, to provide 'targeting persistence.' Many accept the F-15E Strike Eagle as the USAF's most capable fighter for this role due to its ability to deliver a wide variety and large quantity of munitions, its large combat radius, and its ability to loiter for hours before refueling. However, in a fuel-limited scenario, the more fuel-efficient F-16 Fighting Falcon may provide greater persistence. This thesis proposes techniques to quantify persistence and determines whether, with a limited amount of fuel, a strike force comprised of F-16 aircraft can provide greater dynamic targeting persistence than a force comprised of F-15E aircraft.

DTIC

Energy Consumption; F-16 Aircraft; Fighter Aircraft; Fuels

20080010008 Air Command and Staff Coll., Maxwell AFB, AL USA

The Need for a USAF UAV Center of Excellence

Kniskern, Kenneth M; Apr 2006; 38 pp.; In English

Report No.(s): AD-A475634; AU/ACSC/6357/AY06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Unmanned aerial vehicles (UAVs) are not an invention of recent history. But it was the use of UAVs during the conflict over Kosovo in the 1990s which brought them to the forefront as a vehicle to accomplish intelligence, surveillance, and reconnaissance (ISR). Since then, the UAV fleet has expanded exponentially, but not just for the U.S. Air Force (USAF). The U.S. Army and Marines have integrated UAVs into ground operations as well. The UAV is a tool for taking the human out of harm's way for at least a small time period. It is this tactical advantage for ground troops that has created the necessity for an expanded UAV fleet for all services, and it is this necessity that has created problems. During Desert Storm only 5 UAV systems were used in combat. Throughout the 1990s, UAVs began to 'spread their wings.' In 3 1/2 years over Kosovo, the RQ-1 Predator logged over 11,000 hours of flying support. UAVs also have begun to make their mark in combat. As of February 2006, there were over 1,000 UAVs operating in Afghanistan and Iraqi airspaces supporting all the U.S. military services in theater. Each service deploys UAVs in a different manner. In an effort to maximize the future of UAV power and contribution to joint operations, the USAF proposed becoming the service agent for future system development. This includes the planning, funding, and development of operational concepts for unmanned aircraft, DoD-wide. In 2005, the USAF announced the development of the UAV Center of Excellence at Creech AFB, Nevada. Within months, the Joint Staff rejected the USAF's bid and announced a Joint Center of Excellence at Creech AFB. The USAF UAV Center of Excellence was soon discontinued, yet the need for extensive USAF subject matter expertise for the future of UAV operations continues to exist. This paper recommends that the USAF reevaluate the establishment of its UAV Center of Excellence.

DTIC

Drone Vehicles; Military Technology; Pilotless Aircraft; Procurement; Research and Development

20080010613 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Quiet Spike: Softening the Sonic Boom

Wilson, J. R.; Aerospace America; October 2007; ISSN 0740-722X; Volume 45, No. 10, pp. 38-42; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

In order to fly at speeds faster than the speed of sound, a way to mitigate the sonic boom that accompanies such flights has to be manifested. The Federal Aviation Administration has banned supersonic flights that occur over land. Quiet Spike is an innovation that has shown positive results and might lead to a solution. The innovation is described.

CASI

Sonic Booms; Jet Aircraft Noise; Noise Reduction; Shock Wave Attenuation; Spikes (Aerodynamic Configurations)

20080010685 NASA Glenn Research Center, Cleveland, OH, USA

SmaggIce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils

Kreeger, Richard E.; Baez, Marivell; Braun, Donald C.; Schilling, Herbert W.; Vickerman, Mary B.; January 2008; 20 pp.; In English; 45th Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color and black and white illustrations

Report No.(s): NASA/TM-2008-214829; AIAA Paper 2007-0502; E-16022; No Copyright; Avail.: CASI: [A03](http://hdl.handle.net/2060/20080010685), Hardcopy ONLINE: <http://hdl.handle.net/2060/20080010685>

The Surface Modeling and Grid Generation for Iced Airfoils (SmaggIce) software toolkit has been extended to allow interactive grid generation for multi-element iced airfoils. The essential phases of an icing effects study include geometry preparation, block creation and grid generation. SmaggIce Version 2.0 now includes these main capabilities for both single and

multi-element airfoils, plus an improved flow solver interface and a variety of additional tools to enhance the efficiency and accuracy of icing effects studies. An overview of these features is given, especially the new multi-element blocking strategy using the multiple wakes method. Examples are given which illustrate the capabilities of Smagglce for conducting an icing effects study for both single and multi-element airfoils.

Author

Airfoils; Grid Generation (Mathematics); Ice Formation; Computational Fluid Dynamics; Surface Geometry; Computer Graphics

20080010768 Industrial Coll. of the Armed Forces, Washington, DC USA

The Aircraft Industry, 2006

Daniel, Keith; Jan 2006; 28 pp.; In English

Report No.(s): AD-A475298; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475298>

The aircraft industry is well positioned to meet the nation's strategic needs and is growing to meet increased demand fueled by strong U.S. and global economic growth. The overall outlook for the industry is positive. Orders for commercial aircraft are up from a boom in air travel that is likely to continue well into the next decade. Recent increases in defense spending provided a much-needed boost for the rotorcraft and unmanned aerial systems industries; the military fixed-wing sectors are expected to remain profitable as well. The industry is increasingly global and interdependent, and technological innovation and lean business practices are bringing greater efficiencies. Healthy competition exists across the industry. Challenges remain, to include domestic content and export control restrictions, declining aeronautics research, an air traffic management system near full capacity, and a shrinking, aging workforce. Government policy actions are required to address these challenges.

DTIC

Industries; Air Transportation; Technology Utilization; Research Management; Commercial Aircraft

20080010796 Science Applications International Corp., San Diego, CA USA

Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection

Mayton, Donna J; Apr 2007; 314 pp.; In English

Contract(s)/Grant(s): F33615-03-D-5204-0002; Proj-4349

Report No.(s): AD-A475485; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This program sought to characterize and optimize the Sonic IR inspection technique for the inspection of Air Force aircraft components through empirical methods. As part of that effort, TF33 second stage turbine blades, F100 first stage high pressure turbine disks, various compressor blades, landing gear components, and a vane ring were inspected. Elongated scallop samples and fluorescent penetrant inspection (FPI) probability of detection (PoD) samples with known flaws were also tested in an effort to understand the technique. Statistically designed studies were conducted on sets of some of these components and samples, with the analysis leading to definition of optimal operating regions for system operating parameter settings. These parameters may be used later to write test procedures for the specific components. This report covers the assembly of the Sonic IR inspection system and interface materials selection, inspection of various scrapped Air Force aircraft components, and a specimen contamination study. Also covered are the rigorous testing and analysis of the scallop samples, FPI PoD samples, F100 turbine disks, and TF33 turbine blades.

DTIC

Aircraft Equipment; Inspection; Nondestructive Tests; Turbine Blades; Turbines

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.

20080009626 NASA, Washington, DC USA

Method and apparatus for loss of control inhibitor systems

A'Harrah, Ralph C., Inventor; October 23, 2007; 11 pp.; In English

Patent Info.: Filed July 20, 2005; US-Patent-7,285,933; US-Patent-Appl-SN-11/188,227; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009626>

Active and adaptive systems and methods to prevent loss of control incidents by providing tactile feedback to a vehicle operator are disclosed. According to the present invention, an operator gives a control input to an inceptor. An inceptor sensor measures an inceptor input value of the control input. The inceptor input is used as an input to a Steady-State Inceptor Input/Effector Output Model that models the vehicle control system design. A desired effector output from the inceptor input is generated from the model. The desired effector output is compared to an actual effector output to get a distortion metric. A feedback force is generated as a function of the distortion metric. The feedback force is used as an input to a feedback force generator which generates a loss of control inhibitor system (LOCIS) force back to the inceptor. The LOCIS force is felt by the operator through the inceptor.

Official Gazette of the U.S. Patent and Trademark Office

Man Machine Systems; Aircraft Control; Feedback; Sensors; Control Equipment

20080009627 NASA, Washington, DC USA

Method and apparatus for loss of control inhibitor systems

A'Harrah, Ralph C., Inventor; October 23, 2007; 8 pp.; In English

Patent Info.: Filed October 27, 2004; US-Patent-7,285,932; US-Patent-Appl-SN-10/975,119; No Copyright; Avail.: CASI:

A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009627>

Active and adaptive systems and methods to prevent loss of control incidents by providing tactile feedback to a vehicle operator are disclosed. According to the present invention, an operator gives a control input to an inceptor. An inceptor sensor measures an inceptor input value of the control input. The inceptor input is used as an input to a Steady-State Inceptor Input/Effector Output Model that models the vehicle control system design. A desired effector output from the inceptor input is generated from the model. The desired effector output is compared to an actual effector output to get a distortion metric. A feedback force is generated as a function of the distortion metric. The feedback force is used as an input to a feedback force generator which generates a loss of control inhibitor system (LOCIS) force back to the inceptor. The LOCIS force is felt by the operator through the inceptor.

Official Gazette of the U.S. Patent and Trademark Office

Man Machine Systems; Feedback; Aircraft Control; Sensors; Control Equipment

20080009753 NASA Johnson Space Center, Houston, TX, USA

Test and Verification Approach for the NASA Constellation Program

Strong, Edward; February 05, 2008; 31 pp.; In English; U.S. Air Force T&E Days, 5-7 Feb. 2008, Los Angeles, CA, USA;

Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009753>

This viewgraph presentation is a test and verification approach for the NASA Constellation Program. The contents include: 1) The Vision for Space Exploration: Foundations for Exploration; 2) Constellation Program Fleet of Vehicles; 3) Exploration Roadmap; 4) Constellation Vehicle Approximate Size Comparison; 5) Ares I Elements; 6) Orion Elements; 7) Ares V Elements; 8) Lunar Lander; 9) Map of Constellation content across NASA; 10) CxP T&V Implementation; 11) Challenges in CxP T&V Program; 12) T&V Strategic Emphasis and Key Tenets; 13) CxP T&V Mission & Vision; 14) Constellation Program Organization; 15) Test and Evaluation Organization; 16) CxP Requirements Flowdown; 17) CxP Model Based Systems Engineering Approach; 18) CxP Verification Planning Documents; 19) Environmental Testing; 20) Scope of CxP Verification; 21) CxP Verification - General Process Flow; 22) Avionics and Software Integrated Testing Approach; 23) A-3 Test Stand; 24) Space Power Facility; 25) MEIT and FEIT; 26) Flight Element Integrated Test (FEIT); 27) Multi-Element

Integrated Testing (MEIT); 28) Flight Test Driving Principles; and 29) Constellation s Integrated Flight Test Strategy Low Earth Orbit Servicing Capability.

CASI

Constellation Program; NASA Programs; Flight Tests; Systems Integration; General Overviews; Avionics

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.

20080009639 United Technologies Corp., East Hartford, CT USA

Bootstrap data methodology for sequential hybrid model building

Volponi, Allan J., Inventor; Brotherton, Thomas, Inventor; October 2, 2007; 11 pp.; In English

Contract(s)/Grant(s): NAS4-02038

Patent Info.: Filed August 26, 2004; US-Patent-7,277,838; US-Patent-Appl-SN-10/926,760; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009639>

A method for modeling engine operation comprising the steps of: 1. collecting a first plurality of sensory data, 2. partitioning a flight envelope into a plurality of sub-regions, 3. assigning the first plurality of sensory data into the plurality of sub-regions, 4. generating an empirical model of at least one of the plurality of sub-regions, 5. generating a statistical summary model for at least one of the plurality of sub-regions, 6. collecting an additional plurality of sensory data, 7. partitioning the second plurality of sensory data into the plurality of sub-regions, 8. generating a plurality of pseudo-data using the empirical model, and 9. concatenating the plurality of pseudo-data and the additional plurality of sensory data to generate an updated empirical model and an updated statistical summary model for at least one of the plurality of sub-regions.

Official Gazette of the U.S. Patent and Trademark Office

Models; Aircraft Engines; Performance Prediction

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.

20080010856 NASA Glenn Research Center, Cleveland, OH, USA

Implementation Challenges for Multivariable Control: What You Did Not Learn in School

Garg, Sanjay; January 2008; 26 pp.; In English; Guidance, Navigation and Control Conference, 20-23 Aug. 2007, Hilton Head, SC, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 732759.03.01.02.17

Report No.(s): NASA/TM-2008-215027; AIAA Paper-2007-6334; E-16220; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010856>

Multivariable control allows controller designs that can provide decoupled command tracking and robust performance in the presence of modeling uncertainties. Although the last two decades have seen extensive development of multivariable control theory and example applications to complex systems in software/hardware simulations, there are no production flying systems aircraft or spacecraft, that use multivariable control. This is because of the tremendous challenges associated with implementation of such multivariable control designs. Unfortunately, the curriculum in schools does not provide sufficient time to be able to provide an exposure to the students in such implementation challenges. The objective of this paper is to share the lessons learned by a practitioner of multivariable control in the process of applying some of the modern control theory to the Integrated Flight Propulsion Control (IFPC) design for an advanced Short Take-Off Vertical Landing (STOVL) aircraft simulation.

Author

Complex Systems; Multivariable Control; Control Systems Design; STOVL Aircraft; Aircraft Design

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)*.

20080009986 Federal Aviation Administration, Oklahoma City, OK USA

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings

Pfleiderer, Elaine M; Goldman, Scott M; Chidester, Thomas; Oct 2007; 32 pp.; In English

Report No.(s): AD-A475572; DOT/FAA/AM-07/28; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The FAA has initiated efforts to improve weather information, forecasting, and dissemination to enhance both safety and operational efficiency. The FAA has also adopted the System Airport Efficiency Rate (SAER) as a metric of facility operating efficiency that accounts for weather by using either actual demand or the facility-set arrival rate as the denominator, reflecting a reduction in the published ability to handle departures or arrivals due to prevailing weather conditions. Interventions aimed at improving performance should be observable in our metrics. However, acceptance and widespread use of the SAER raises the question of whether a weather-adjusted measure is sensitive enough to evaluate the efficacy of interventions aimed at improving performance during inclement weather. One such intervention is the Integrated Terminal Weather System (ITWS). In the present study, we applied time series analysis to average daily and monthly SAERs at 13 airports. We modeled SAER data at each airport prior to ITWS implementation and then tested whether each ITWS build (i.e., subsequent software updates and added functionality) affected SAER values. Though some statistically significant effects were found (both positive and negative), the patterns of these effects were not consistent enough to draw any definite conclusions. The fact that we were unable to make a clear determination about the effectiveness of ITWS implementation suggests that the SAER may 'control out' the variance needed to detect the consequences of interventions. Thus, it is imperative that the raw data from which they are derived remain readily available to evaluate the efficacy of changes to the system, because simply monitoring facility and system effectiveness measures may obscure or discount intervention effects.

DTIC

Airports; Forecasting; Meteorological Parameters; Ratings; System Effectiveness; Systems Integration; Terminal Facilities; Time Series Analysis

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*.

20080009621 NASA, Washington, DC USA

Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics

Cepollina, Frank J., Inventor; Burns, Richard D., Inventor; Holz, Jill M., Inventor; Corbo, James E., Inventor; Jedhrich, Nicholas M., Inventor; November 13, 2007; 48 pp.; In English

Patent Info.: Filed February 1, 2007; US-Patent-7,293,743; US-Patent-Appl-SN-11/670,270; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009621>

This invention is a method and supporting apparatus for autonomously capturing, servicing and de-orbiting a free-flying spacecraft, such as a satellite, using robotics. The capture of the spacecraft includes the steps of optically seeking and ranging the satellite using LIDAR; and matching tumble rates, rendezvousing and berthing with the satellite. Servicing of the spacecraft may be done using supervised autonomy, which is allowing a robot to execute a sequence of instructions without intervention from a remote human-occupied location. These instructions may be packaged at the remote station in a script and uplinked to the robot for execution upon remote command giving authority to proceed. Alternately, the instructions may be generated by Artificial Intelligence (AI) logic onboard the robot. In either case, the remote operator maintains the ability to abort an instruction or script at any time, as well as the ability to intervene using manual override to teleoperate the robot. In one embodiment, a vehicle used for carrying out the method of this invention comprises an ejection module, which includes the robot, and a de-orbit module. Once servicing is completed by the robot, the ejection module separates from the de-orbit module, leaving the de-orbit module attached to the satellite for de-orbiting the same at a future time. Upon separation, the

ejection module can either de-orbit itself or rendezvous with another satellite for servicing. The ability to de-orbit a spacecraft further allows the opportunity to direct the landing of the spent satellite in a safe location away from population centers, such as the ocean.

Official Gazette of the U.S. Patent and Trademark Office

Robotics; Satellites; Space Debris; Spacecraft Structures; Orbits

20080009657 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Planetary Protection Provisions for Mars: Forward and Back Considerations

Buxbaum, Karen L.; December 16, 2004; 10 pp.; In English; Science Writers Workshop at American Geophysical Union, 16 Dec. 2004, San Francisco, CA, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/40608>

This document discusses various roles, challenges, and progress in the field of planetary protection provisions for Mars. The document additionally examines planetary protection technology needs and the Mars exploration pathway,

Derived from text

Mars Exploration; Planetary Protection; Technology Assessment

20080009865 Naval Research Lab., Washington, DC USA

Project VANGUARD Report No. 2, Report of Progress

Mar 7, 1956; 23 pp.; In English

Report No.(s): AD-A475368; NRL/FR-4717; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475368>

Progress on the Vanguard program continued during January. The Army accepted responsibility for the tracking network pending allocation of the necessary funds, and a preliminary survey has been made of the South American locations. The Army District Engineers are now directing the construction of the launching facilities and assembly hangar at AFMTC. The use of AFMTC has been authorized by the Air Force, which is also providing test range facilities, administrative space, range instrumentation and the launching facilities and hangar being constructed under Army direction. The latter facilities are expected to be ready for the launching of the first test vehicle (Viking 13) in November 1956. Topographical considerations have resulted in the location of the Washington area Minitrack station at Blossom Point, Maryland, rather than the Chesapeake Bay Annex of NRL. The launching vehicle design specification (NRL 4100-1) has been forwarded to the Martin Company. The revised weight and performance parameters provide for an excess velocity margin of 1443 feet per second for a 300-mile altitude. Trajectory and performance studies continue, and first- and second-stage spatial mockups have been released for manufacture. About 50 percent of all major structural design for the first stage is now complete, including the design of dynamic model of the powerplant and tail section. Vehicle instrumentation has been extensively discussed with PAFB and various contractors, and a tentative frequency allocation has been obtained from the PAFB frequency coordinator. The contractors for parallel development of the third stage have been chosen.

DTIC

Artificial Satellites; Launching; Test Facilities

14

GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and test chambers and simulators. Also includes extraterrestrial bases and supporting equipment. For related information see also *09 Research and Support Facilities (Air)*.

20080009732 NASA Johnson Space Center, Houston, TX, USA

Cargo Integration Products for External Release

Sills, Joel W.; [2008]; 1 pp.; In English; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009732>

This document consists of a listing of integration products by function: Reconfiguration Engineering, Payload Interface Requirements, and Cargo Integration Analysis. The products may be accessed from, the Flight Operation and Integration Office page, i.e. <http://sspweb.jsc.nasa.gov/>.

CASI

Cargo; Flight Operations

20080009770 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Methods and Systems for Advanced Spaceport Information Management

Fussell, Ronald M., Inventor; Ely, Donald W., Inventor; Meier, Gary M., Inventor; Halpin, Paul C., Inventor; Meade, Phillip T., Inventor; Jacobson, Craig A., Inventor; Blackwell-Thompson, Charlie, Inventor; November 27, 2007; 15 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 17 Mar. 2005; US-Patent-7,302,364; US-Patent-Appl-SN-11/083420; US-Patent-Appl-SN-60/593014; NASA-Case-KSC-12669; No Copyright; Avail.: CASI: **A03**, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009770>

Advanced spaceport information management methods and systems are disclosed. In one embodiment, a method includes coupling a test system to the payload and transmitting one or more test signals that emulate an anticipated condition from the test system to the payload. One or more responsive signals are received from the payload into the test system and are analyzed to determine whether one or more of the responsive signals comprises an anomalous signal. At least one of the steps of transmitting, receiving, analyzing and determining includes transmitting at least one of the test signals and the responsive signals via a communications link from a payload processing facility to a remotely located facility. In one particular embodiment, the communications link is an Internet link from a payload processing facility to a remotely located facility (e.g. a launch facility, university, etc.).

Author

Information Management; Launching Bases; Space Transportation; Systems Management; Ground Operational Support System

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*.

20080009616 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle

Davis, Stephan R.; Tinker, Michael L.; Tuma, Meg; July 08, 2007; 5 pp.; In English; AIAA Joint Propulsion Conference, 8-11 Jul. 2007, Cincinnati, OH, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: **A01**, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009616>

In accordance with the U.S. Vision for Space Exploration and the nation's desire to again send humans to explore beyond Earth orbit, NASA has been tasked to send human beings to the moon, Mars, and beyond. It has been 30 years since the USA last designed and built a human-rated launch vehicle. NASA is now building the Ares I crew launch vehicle, which will loft the Orion crew exploration vehicle into orbit, and the Ares V cargo launch vehicle, which will launch the Lunar Surface Access Module and Earth departure stage to rendezvous Orion for missions to the moon. NASA has marshaled unique resources from the government and private sectors to perform the technically and programmatically complex work of delivering astronauts to orbit early next decade, followed by heavy cargo late next decade. Our experiences with Saturn and the Shuttle have taught us the value of adhering to sound systems engineering, such as the 'test as you fly' principle, while applying aerospace best practices and lessons learned. If we are to fly humans safely aboard a launch vehicle, we must employ a variety of methodologies to reduce the technical, schedule, and cost risks inherent in the complex business of space transportation. During the Saturn development effort, NASA conducted multiple demonstration and verification flight tests to prove technology in its operating environment before relying upon it for human spaceflight. Less testing on the integrated Shuttle system did not reduce cost or schedule. NASA plans a progressive series of demonstration (ascent), verification (orbital), and mission flight tests to supplement ground research and high-altitude subsystem testing with real-world data, factoring the results of each test into the next one. In this way, sophisticated analytical models and tools, many of which were not available during Saturn and Shuttle, will be calibrated and we will gain confidence in their predictions, as we gain hands-on experience in operating the first of two new launch vehicle systems. The Ares I-1 flight test vehicle (FTV) will incorporate a mix of flight and mockup hardware, reflecting a configuration similar in mass, weight, and shape (outer mold line or OML) to the operational vehicle. It will be powered by a four-segment reusable solid rocket booster (RSRB), which is currently in Shuttle inventory, and will be modified to include a fifth, inert segment that makes it approximately the same size and weight as the five segment RSRB, which will be available for the second flight test in 2012. The Ares I-1 vehicle configuration is shown. Each test flight has specific objectives appropriate to the design analysis cycle in progress. The Ares I-1 demonstration test,

slated for April 2009, gives NASA its first opportunity to gather critical data about the flight dynamics of the integrated launch vehicle stack, understand how to control its roll during flight, and other characterize the severe stage separation environment that the upper stage will experience during future operational flights. NASA also will begin the process of modifying the launch infrastructure and fine-tuning ground and mission operational scenarios, as NASA transitions from the Shuttle to the Ares/Orion system.

Author

Ares I Launch Vehicle; Crew Exploration Vehicle; Flight Test Vehicles; Solid Propellant Rocket Engines; Space Exploration; Space Shuttle Boosters

20080009845 Industrial Coll. of the Armed Forces, Washington, DC USA

Space Industry

Bailey, Marianne; Biddlecombe, Kathleen D; Campos, Ramon; Estridge, Jon D; Frakes, Patrick F; Kelly, Brian T; Kunec, Daniel L; Morgan, Jay P; Neuberger, Bruce W; Rogers, Andrew R; Jan 2006; 30 pp.; In English
Report No.(s): AD-A475303; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475303>

The U.S. space industry is a product of Government necessity born of national security imperatives. From its inception, space has provided competitive advantages to the USA in terms of national security, national pride, and technological superiority. Unfortunately, the USA' favorable position with regard to space is eroding and, in some areas, it is losing its competitive advantage. Lack of unified Government leadership, restrictive U.S. trade policies, scarcity of critical systems engineering skills in the workforce, and emerging commercial and entrepreneurial activities are creating both obstacles and opportunities in a complex market environment. Establishment of a comprehensive national space policy in conjunction with a critical review of current export policies is necessary to ensure the health of this vital industry. As a customer, regulator, and advocate, the Government must take appropriate steps to promote favorable global trade conditions for the space industry and reaffirm U.S. leadership. This paper defines the industry, assesses the current conditions, and postulates the industry outlook. The paper also will describe the role of government in the space industry, identify specific challenges facing the industry, and provide recommendations to mitigate the negative effects of these challenges. A common framework used to define the space industry is a matrix depicting two sets of elements: sectors and segments. Sectors are the markets served by space-based products and services and segments are those functions necessary to employ space capabilities. The three sectors are National Security Space, which includes defense and intelligence-related space activities; Civil Space, whose primary customer is NASA, but includes all other nondefense Government space activities; and Commercial Space. The three segments are satellite manufacturing; launch vehicle manufacturing and launch services; and satellite operations and services.

DTIC

Aerospace Engineering; Aerospace Systems; Forecasting; Industries; Policies; Technology Assessment; United States

20080009876 Air Force Research Lab., Edwards AFB, CA USA

Review of Laser Lightcraft Propulsion System (Preprint)

Davis, Eric W; Mead, Jr, Franklin B; Oct 16, 2007; 13 pp.; In English

Contract(s)/Grant(s): Proj-4847

Report No.(s): AD-A475395; AFRL-PR-ED-TP-2007-470; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475395>

Laser-powered 'Lightcraft' systems that deliver nano-satellites to LEO have been studied for the Air Force Research Laboratory (AFRL). The study was built on the extensive Lightcraft laser propulsion technology already developed by theoretical and experimental work by the AFRL's Propulsion Directorate at Edwards AFB, CA. Here we review the history and engineering-physics of the laser Lightcraft system and its propulsive performance. We will also review the effectiveness and cost of a Lightcraft vehicle powered by a high-energy laser beam. One result of this study is the significant influence of laser wavelength on the power lost during laser beam propagation through Earth's atmosphere and in space. It was discovered that energy and power losses in the laser beam are extremely sensitive to wavelength for Earth-to-Orbit missions, and this significantly affects the amount of mass that can be placed into orbit for a given maximum amount of radiated power from a ground-based laser.

DTIC

High Power Lasers; Laser Beams; Laser Propulsion; Propulsion System Configurations; Propulsion System Performance

20080009877 Air Force Research Lab., Edwards AFB, CA USA

Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint)

Lee, R H; Bauer, A M; Killingsworth, M D; Lilly, T C; Duncan, J A; Ketsdever, Andrew D; May 24, 2007; 12 pp.; In English
Contract(s)/Grant(s): Proj-5026

Report No.(s): AD-A475396; AFRL-PR-ED-JA-2007-306; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475396>

Advances in micro-technology manufacturing and capability have led to an increased interest in micro and nano-satellites. A propulsion system has been designed to meet the on-orbit attitude control requirements for nano-spacecraft. The Free Molecule Micro-Resistojet (FMMR), a low cost, low power, high propellant storage density, and green propulsion system, has been analyzed in this study to determine its ability to provide a slew maneuver for a typical 10 kg nanosatellite. Additionally, a FMMR technology demonstrator (TD) has been fabricated using traditional and Microelectromechanical Systems (MEMS) techniques. The TD has been analyzed and tested in this study to determine its performance characteristics while operating with water propellant. Experimental data shows that the FMMR, with a heated wall temperature of 580 K, can attain a specific impulse of 79.2 seconds with a thrust level of 129 micro-N. For a given mass flow, higher thrust levels can be achieved by increasing the temperature of the FMMR heater chip. The experimental results agree favorably with predicted values from kinetic theory. Applying the measured performance of the TD to an optimized setup, the FMMR system could provide a 45-degree slew of a typical nanosatellite in 60 seconds, which is acceptable for many nanosatellite applications.

DTIC

Molecules; Propellants; Resistojet Engines; Water

20080009944 Cornell Univ., Ithaca, NY USA

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program

Peck, Mason A; Jan 2007; 37 pp.; In English

Contract(s)/Grant(s): FA9550-05-1-0280

Report No.(s): AD-A475467; No Copyright; Avail.: Defense Technical Information Center (DTIC)

CUSat is Cornell University's entry in the University Nanosatellite Program (UNP4) . The student team has met many of the objectives of the program already, including education and outreach. The project promises a first-ever, end-to-end in-orbit inspection system. with centimeter-level accuracy, carrier-phase differential GPS enables CUSat to navigate and use its cameras to gather target-satellite imagery. In the ground segment, image-processing techniques verify the CDGPS position and orientation estimates and provide a 3D model of the target satellite for the data end-user.

DTIC

Artificial Satellites; End-to-End Data Systems; Global Positioning System; Image Processing; Inspection; Nanosatellites; Nanotechnology; Satellite Imagery; Targets; University Program

20080009996 Air Command and Staff Coll., Maxwell AFB, AL USA

The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime

McKenna, Sean S; Apr 2006; 36 pp.; In English

Report No.(s): AD-A475592; AU/ACSC/7210/AY06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

It is a long-held belief that the news media will go to almost any length to get a story. Television reporters have waded into the middle of civil war firefights to show viewers and readers human suffering up close, used hidden-camera tricks to flush out stories on consumer fraud, and even laid down their lives to expose human rights atrocities by international governments. Over the last 10 years, in the midst of a telecommunications revolution, the media can now gather and report stories in ways that once seemed impossible. The advent of commercial satellite imaging has made it possible for print and broadcast media to show photographs and report stories that otherwise may have gone unnoticed. This is especially true during military conflicts like the Global War on Terrorism, where reporters cannot always get access to engagements due to safety and security reasons. However, satellites orbiting hundred of miles above the earth's surface have replaced the cameraman and photographer on the ground in many cases, with their ability to look down into forbidden areas and capture stories. During wartime, access to the battlefield is a critical issue and satellite technology has made this more contentious than ever. Both the news media and the U.S. government are trying to come to terms with exactly what, if any, restrictions should be placed on this technology, due to its intrusive nature and possible ramifications on national security. The purpose of this research paper is to explore how the mass media uses satellite imaging to gather information during wartime and determine what impact this technology has had, and will have, on advancing the art of news telling during armed conflict. Does satellite imagery

impact the U.S. military's ability to effectively wage war in Afghanistan and Iraq? What challenges does this technology present for future military conflicts?

DTIC

Imaging Techniques; Military Operations; News Media; Satellite Imagery; Satellite-Borne Photography

20080010678 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Shuttle to Orion: First Steps Back to Orbit

Jones, Thomas D.; Aerospace America; October 2007; ISSN 0740-722X; Volume 45, No. 10, pp. 26-20; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

With the expected retirement of the Space Shuttle, there will be no launches by the USA to orbit for a period of a few years. This article reviews the feelings of an astronaut upon his first and subsequent rides up the elevator, to the anticipation of the new Ares I, Orion, Ares V. The pad modifications are planned, but cannot begin until the Shuttle operations have concluded. The wait for Orion, while shorter than the wait for the shuttle operations after the conclusion of the Apollo missions, according to the author may be more frustrating due to the fact that the International Space Station will be for the most part inaccessible to much of the USA Space program.

CASI

Astronauts; Space Programs; Space Transportation System Flights; Constellation Program; Launching Pads; Spacecraft Launching; Launching Bases

20080010745 Army Command and General Staff Coll., Fort Leavenworth, KS USA

Basic and Operational Doctrine for Airpower in Irregular Warfare

Chavez, Jr , Robert M; May 24, 2007; 89 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475385; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475385>

The US Air Force, and the U.S. armed forces separate service air arms, have historically wrestled with how to apply air and space power to non-traditional forms of warfare, such as insurgency and counterinsurgency. The U.S. joint community's latest development of the warfare spectrum includes insurgency and counterinsurgency under the construct of irregular warfare, delineating it from traditional war, which is characterized by conventional, state-on-state major combat operations. This monograph asks the question: what is the best synthesis of ideas for creating a basic and operational irregular warfare airpower doctrine? The study establishes a set of criteria for evaluating irregular warfare airpower doctrine based on analytical studies by several prominent and recent small war airpower researchers and evaluates current and past irregular warfare airpower doctrine through this analytical lens. The inquiry concludes that through the short history of powered flight there have been numerous examples of viable irregular warfare airpower theory and doctrine, however, the current state of such doctrine is uneven, with the greatest deficiencies being at the basic and first-tier operational levels. These deficiencies include properly defining the full spectrum of conflict, providing a fundamental and operationalizing airpower theory incorporating irregular warfare, and specifying air and space power roles and capabilities with regard to counterinsurgency and support to counterinsurgency. The study provides recommendations for improvement in these areas with the intent of building USAF irregular warfare airpower doctrine in preparation for the refinement and development of complementary joint doctrine.

DTIC

Warfare; Armed Forces; Military Technology

16

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*.

20080010883 NASA Johnson Space Center, Houston, TX, USA

STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A)

James, John T.; January 2008; 2 pp.; In English; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010883>

The toxicological assessments of 2 grab sample canisters (GSCs) from the Shuttle are reported. Formaldehyde badges

were not used. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (C-13-acetone, fluorobenzene, and chlorobenzene) from the 2 GSCs averaged 111, 82, and 78%, respectively. The Shuttle atmosphere was acceptable for human respiration.

Derived from text

Air Quality; International Space Station; Space Transportation System; Space Shuttles; Sample Return Missions; Toxicology

17

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*.

20080010139 Research and Technology Organization, Neuilly-sur-Seine, France

2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO)

Woods-Vedeler, Jessica A.; February 2007; 84 pp.; In English; Original contains color illustrations

Report No.(s): RTO-TM-SPD-001; AC/323(SPD-001)TP/01; Copyright; Avail.: CASI: [C01](#), CD-ROM: [A05](#), Hardcopy

This report describes the motivation for and a strategy to enhance the NATO Research and Technology Organisation's (RTO) current space research effort to reflect NATO's growing military dependence on space systems. Such systems and services provided by these systems are critical elements of military operations. NATO uses space systems for operational planning and support, communication, radio navigation, multi-sensor and multi-domain demonstrations. Such systems are also used to promote regional stability. A quantitative analysis of work related to space in the NATO RTO showed that during the period of 1998 - 2004, 5% of the research pursued in the NATO RTO has been clearly focused on space applications. Challenging environmental and organizational barriers for increasing RTO space research were identified. In part, these include lack of sufficient space expertise representation on panels, the military sensitivity of space, current panel work loads and the need for specific technical recommendations from peers. A strategy for enhancing space research in the RTO is to create a limited-life Space Advisory Group (SAG) composed of Space Expert Consultants who are panel members with appropriate expertise and additional expertise from the nations. The SAG will recommend and find support in the nations for specific technical activities related to space in the areas of Space Science, Remote Sensing Data Analysis, Spacecraft Systems, Surveillance and Early Warning, Training and Simulation and Policy. An RTO Space Advisory Group will provide an organizational mechanism to gain recognition of RTO as a forum for trans-Atlantic defence space research and to enhance space research activities.

Author

Military Operations; Space Surveillance (Spaceborne); Satellite Communication; Early Warning Systems; North Atlantic Treaty Organization (NATO); Management Planning

18

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*.

20080009762 NASA Johnson Space Center, Houston, TX, USA

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007

Golden, John; Lorenz, Mary J.; Alred, John; Koontz, Steven L.; Pedley, Michael; [2008]; 2 pp.; In English; Ninth International Space Conference-Protection of Materials and Structures from the Space Environment, 19-23 May 2008, Toronto, Canada

Contract(s)/Grant(s): 401769.06.03.06.02.17; Copyright; Avail.: CASI: [A01](#), Hardcopy

The performance of ISS spacecraft materials and systems on prolonged exposure to the low-Earth orbit (LEO) space flight is reported in this paper. In-flight data, flight crew observations, and the results of ground-based test and analysis directly supporting programmatic and operational decision-making are presented. The space flight environments definitions (both natural and induced) used for ISS design, material selection, and verification testing are shown, in most cases, to be more severe than the actual flight environment accounting for the outstanding performance of ISS as a long mission duration

spacecraft. No significant ISS material or system failures have been attributed to spacecraft-environments interactions. Nonetheless, ISS materials and systems performance data is contributing to our understanding of spacecraft material interactions in the spaceflight environment so as to reduce cost and risk for future spaceflight projects and programs. Orbital inclination (51.6°) and altitude (nominally near 360 km) determine the set of natural environment factors affecting the functional life of materials and systems on ISS. ISS operates in an electrically conducting environment (the F2 region of Earth's ionosphere) with well-defined fluxes of atomic oxygen, other charged and neutral ionospheric plasma species, solar UV, VUV, and x-ray radiation as well as galactic cosmic rays, trapped radiation, and solar cosmic rays (1-4). The LEO micrometeoroid and orbital debris environment is an especially important determinant of spacecraft design and operations (5, 6). The magnitude of several environmental factors varies dramatically with latitude and longitude as ISS orbits the Earth (1-4). The high latitude orbital environment also exposes ISS to higher fluences of trapped energetic electrons, auroral electrons, solar cosmic rays, and galactic cosmic rays (1-4) than would be the case in lower inclination orbits, largely as a result of the overall shape and magnitude of the geomagnetic field (1-4). As a result, ISS exposure to many environmental factors can vary dramatically along a particular orbital ground track, and from one ground track to the next, during any 24-hour period.

Author

Aerospace Environments; International Space Station; Spacecraft Environments; Spacecraft Design; Flight Characteristics; Ground Tests; System Failures; Geomagnetism

20080010141 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification

Chung, Shirley; Barengoltz, Jack; Kern, Roger; Koukol, Robert; Cash, Howard; October 2006; 49 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): NAS7-03001

Report No.(s): JPL Publication 06-6; Copyright; Avail.: CASI: [A03](#), Hardcopy

The Jet Propulsion Laboratory, in conjunction with the NASA Planetary Protection Officer, has selected the vapor phase hydrogen peroxide sterilization process for continued development as a NASA approved sterilization technique for spacecraft subsystems and systems. The goal is to include this technique, with an appropriate specification, in NPR 8020.12C as a low temperature complementary technique to the dry heat sterilization process. To meet microbial reduction requirements for all Mars in-situ life detection and sample return missions, various planetary spacecraft subsystems will have to be exposed to a qualified sterilization process. This process could be the elevated temperature dry heat sterilization process (~115 C for 40 hours) which was used to sterilize the Viking lander spacecraft. However, with utilization of such elements as highly sophisticated electronics and sensors in modern spacecraft, this process presents significant materials challenges and is thus an undesirable bioburden reduction method to design engineers. The objective of this work is to introduce vapor hydrogen peroxide (VHP) as an alternative to dry heat microbial reduction to meet planetary protection requirements. The VHP process is widely used by the medical industry to sterilize surgical instruments and biomedical devices, but high doses of VHP may degrade the performance of flight hardware, or compromise material properties. Our goal for this study was to determine the minimum VHP process conditions to achieve microbial reduction levels acceptable for planetary protection. In order to evaluate the effectiveness of VHP for the inactivation of the standard spore challenge organism, *Geobacillus stearothermophilus*, the STERIS Corporation, under contract to the Jet Propulsion Laboratory (JPL), conducted several series of experiments. The experiments were conducted to determine VHP process parameters that provided significant reductions in spore viability while allowing survival of sufficient spores for statistically significant enumeration. In addition to the obvious process parameters hydrogen peroxide concentration, number of pulses, and exposure duration the investigation also considered the possible effect of environmental parameters. Temperature, relative humidity, and material substrate effects on lethality were also studied. Finally, a comparison of assays performed by STERIS and JPL of spore-inoculated coupons exposed to VHP under the same test conditions was included. Biological indicators were inoculated with more than 1 million *Geobacillus stearothermophilus* (ATCC 7953) spores on stainless steel coupons and packaged in Tyvek/Mylar pouches. For the tests on the effect of material substrates, the same inoculation procedure was employed on the selected material substrates. All exposures were conducted in a STERIS VHP MD2000 Series Sterilization System. The process involves a conditioning phase, injection of liquid hydrogen peroxide, a sterilization phase (in vacuum), and an aeration phase with high-efficiency particulate air filter (HEPA)-filtered air. The derivation of D-values from the statistically significant (i.e., non-zero) lethality data permitted conservative recommendations for a planetary protection specification. The outcome of this study provided an optimization of test sterilizer process conditions: VHP concentration, process duration, a process temperature range for which

the worst case D-value may be imposed, a process humidity range for which the worst case D-value may be imposed, and robustness to selected spacecraft material substrates.

Author

Vapor Phases; Hydrogen Peroxide; Sterilization; Interplanetary Spacecraft; Planetary Protection; Surgical Instruments; Bioinstrumentation; Dry Heat

20080010667 NASA Langley Research Center, Hampton, VA, USA

Reconstruction of the Genesis Entry

Desai, Prasun N.; Qualls, Garry D.; Schoenenberger, Mark; November 07, 2005; 16 pp.; In English; 1st Georgia TecSpace System Engineering Conference, 7-10 Nov. 2005, Atlanta, GA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): 23-624-09-01

Report No.(s): Paper No. GT-SSEC.C.1; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010667>

This paper provides an overview of the findings from a reconstruction analysis of the Genesis capsule entry. First, a comparison of the atmospheric properties (density and winds) encountered during the entry to the pre-entry profile is presented. The analysis that was performed on the video footage (obtained from the tracking stations at UTTR) during the descent is then described from which the Mach number at the onset of the capsule tumble was estimated following the failure of the drogue parachute deployment. Next, an assessment of the Genesis capsule aerodynamics that was extracted from the video footage is discussed, followed by a description of the capsule hypersonic attitude that must have occurred during the entry based on examination of the recovered capsule heatshield. Lastly, the entry trajectory reconstruction that was performed is presented.

Derived from text

General Overviews; Genesis Mission; Space Capsules; Spacecraft Trajectories; Spacecraft Reentry

20080010742 NASA Johnson Space Center, Houston, TX, USA

STS-118 Radiator Impact Damage

Lear, Dana M.; Hyde, J.; Christiansen, E.; Herrin, J.; Lyons, F.; [2008]; 4 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): 377916/-6/-3/-5/-4/-1; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010742>

During the August 2007 STS-118 mission to the International Space Station, a micro-meteoroid or orbital debris (MMOD) particle impacted and completely penetrated one of shuttle Endeavour's radiator panels and the underlying thermal control system (TCS) blanket, leaving deposits on (but no damage to) the payload bay door. While it is not unusual for shuttle orbiters to be impacted by small MMOD particles, the damage from this impact is larger than any previously seen on the shuttle radiator panels. A close-up photograph of the radiator impact entry hole is shown in Figure 1, and the location of the impact on Endeavour's left-side aft-most radiator panel is shown in Figure 2. The aft radiator panel is 0.5-inches thick and consists of 0.011 inch thick aluminum facesheets on the front and back of an aluminum honeycomb core. The front facesheet is additionally covered by a 0.005 inch thick layer of silver-Teflon thermal tape. The entry hole in the silver-Teflon tape measured 8.1 mm by 6.4 mm (0.32 inches by 0.25 inches). The entry hole in the outer facesheet measured 7.4 mm by 5.3 mm (0.29 inches by 0.21 inches) (0.23 inches). The impactor also perforated an existing 0.012 inch doubler that had been bonded over the facesheet to repair previous impact damage (an example that lightning can strike the same place twice, even for MMOD impact). The peeled-back edge around the entry hole, or lip, is a characteristic of many hypervelocity impacts. High velocity impact with the front facesheet fragmented the impacting particle and caused it to spread out into a debris cloud. The debris cloud caused considerable damage to the internal honeycomb core with 23 honeycomb cells over a region of 28 mm by 26 mm (1.1 inches by 1.0 inches) having either been completely destroyed or partially damaged. Figure 3 is a view of the exit hole in the rear facesheet, and partially shows the extent of the honeycomb core damage and clearly shows the jagged petaled exit hole through the backside facesheet. The rear facesheet exit hole damage including cracks in the facesheet measures 14 mm by 14 mm (0.55 inches by 0.55 inches). The remnants of the impacting particle and radiator panel material blown through the rear facesheet hole also created two penetrations in the TCS blanket 115 mm (4.5 inches) behind the rear facesheet. Figure 4 shows these two impacts, which are located 75 mm (3 inches) apart. Some deposits of material were found on the payload bay door beneath the TCS blanket, but no additional damage occurred to the door. Figure 5 illustrates the relationship of the facesheet entry hole to the TCS blanket damage, which may indicate the direction of the impacting particle. The image on the left side of Figure 5 shows an overhead view of the damaged radiator after the facesheet holes were cored out of the panel. The entry hole location and the two underlying TCS blanket damage sites are annotated on the image. Section A-A, running through the entry hole and TCS blanket damage locations, describes a 25 angle from the longitudinal axis of the shuttle. The

2nd impact angle can be seen in section A-A on the right side of Figure 5. An average 17 angle of impact to the surface normal was derived by measuring the angles of the two damage sites in TCS blanket to the entry hole.

Author

Micrometeoroids; Space Transportation System; Impact Damage; Temperature Control; Space Debris; Panels; Honeycomb Structures; Space Shuttle Orbiters

20080010786 NASA Johnson Space Center, Houston, TX, USA

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development

Sutter, B.; Lauer, H. V.; Golden, D. C.; Ming, D. W.; Boynton, W. V.; [2008]; 2 pp.; In English; Lunar Planetary Science Conference, 10-14 Mar. 2008, Houston, TX, USA; Original contains black and white illustrations; Copyright; Avail.:

CASI: [A01](#), Hardcopy

The Mars Scout Phoenix lander will land in the north polar region of Mars in May, 2008. One objective of the Phoenix lander is to search for evidence of past life in the form of molecular organics that may be preserved in the subsurface soil. The Thermal Evolved Gas Analyzer (TEGA) was developed to detect these organics by coupling a simultaneous differential thermal analyzer (SDTA) with a mass spectrometer. Martian soil will be heated to approx. 1000 C and potential organic decomposition products such as CO₂, CH₄ etc. will be examined for with the MS. TEGA s SDTA will also assess the presence of endothermic and exothermic reactions that are characteristic of soil organics and minerals as the soil is heated. The MS in addition to detecting organic decomposition products, will also assess the levels of soil inorganic volatiles such as H₂O, SO₂, and CO₂. Organic detection has a high priority for this mission; however, TEGA has the ability to provide valuable insight into the mineralogical composition of the soil. The overall goal of this work is to develop a TEGA database of minerals that will serve as a reference for the interpretation of Phoenix-TEGA. Previous databases for the ill-fated Mars Polar Lander (MPL)-TEGA instrument only went to 725 C. Furthermore, the MPL-TEGA could only detect CO₂ and H₂O while the Phoenix-TEGA MS can examine up to 144 atomic mass units. The higher temperature Phoenix-TEGA SDTA coupled with the more capable MS indicates that a higher temperature database is required for TEGA interpretation. The overall goal of this work is to develop a differential scanning calorimeter (DSC) database of minerals along with corresponding MS data of evolved gases that can used to interpret TEGA data during and after mission operations. While SDTA and DSC measurement techniques are slightly different (SDTA does not use a reference pan), the results are fundamentally similar and thus DSC is a useful technique in providing comparative data for the TEGA database. The objectives of this work is to conduct DSC and MS analysis up to 1000 C of select minerals that may be found in the martian soil.

Author

Calorimeters; Gas Analysis; Gas Detectors; Mars Polar Lander; Mineralogy; Decomposition; Endothermic Reactions; Exothermic Reactions; Mass Spectrometers

19

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*.

20080009775 NASA Marshall Space Flight Center, Huntsville, AL, USA

Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors

Quattrochi, Dale a.; Luvall, Jeffrey C.; Anderson, Martha; Hook, Simon; December 11, 2006; 1 pp.; In English; 2006 Fall AGU Meeting, 11-15 Dec. 2006, San Francisco, CA, USA; No 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 ~~~iairesolutions.

Author

Infrared Detectors; Remote Sensing; Satellite Instruments; Satellite Observation; Infrared Radiometers

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*.

20080009730 NASA Johnson Space Center, Houston, TX, USA

High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures

Ray, David M.; Greene, Nathanael J.; Revilock, Duane; Sneddon, Kirk; Anselmo, Estelle; [2008]; 10 pp.; In English; 49th AIAA Structures, Structural Dynamics and Materials Conference, 7-10 Apr. 2008, Schaumburg, IL, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A02](#), Hardcopy

Development tests were conducted to evaluate the performance of 2 COPV designs at cryogenic temperatures. This allows for risk reductions for critical components for a Gaseous Helium (GHe) Pressurization Subsystem for an Advanced Propulsion System (APS) which is being proposed for NASA's Constellation project and future exploration missions. It is considered an advanced system since it uses Liquid Methane (LCH₄) as the fuel and Liquid Oxygen (LO₂) as the oxidizer for the propellant combination mixture. To avoid heating of the propellants to prevent boil-off, the GHe will be stored at subcooled temperatures equivalent to the LO₂ temperature. Another advantage of storing GHe at cryogenic temperatures is that more mass of the pressurized GHe can be charged in to a vessel with a smaller volume, hence a smaller COPV, and this creates a significant weight savings versus gases at ambient temperatures. The major challenge of this test plan is to verify that a COPV can safely be used for spacecraft applications to store GHe at a Maximum Operating Pressure (MOP) of 4,500 psig at 140R to 160R (-320 F to -300 F). The COPVs for these tests were provided by ARDE, Inc. who developed a resin system to use at cryogenic conditions and has the capabilities to perform high pressure testing with LN₂.

Author

Cryogenics; Propellants; Propulsion; Propulsion System Configurations; Cryogenic Temperature; Liquefied Gases

20080010688 NASA Glenn Research Center, Cleveland, OH, USA

NEXT Ion Propulsion System Development Status and Performance

Patterson, Michael J.; Benson, Scott W.; January 2008; 25 pp.; In English; 43rd Joint Propulsion Conference, 8-11 Jul. 2007, Cincinnati, OH, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 346620.04.05.03.11

Report No.(s): NASA/TM-2008-214986; AIAA Paper 2007-5199; E-16148; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010688>

NASA's Evolutionary Xenon Thruster (NEXT) project is developing next generation ion propulsion technologies to provide future NASA science missions with enhanced mission performance benefit at a low total development cost. The objective of the NEXT project is to advance next generation ion propulsion technology by producing engineering model and prototype model system components, validating these through qualification-level and integrated system testing, and ensuring preparedness for transitioning to flight system development. This paper describes the NEXT ion propulsion system development status, characteristics and performance. A review of mission analyses results conducted to date using the NEXT system is also provided.

Author

Ion Propulsion; Ion Engines; Systems Engineering; Systems Integration

20080010870 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Fast Track for a Slower Rocket Engine

Flinn, Edward D.; Aerospace America; October 2007; ISSN 0740-722X; Volume 45, No. 10, pp. 24-25; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

This article reviews NASA's efforts to create a rocket engine that can decelerate in a controlled fashion. Most rocket engines are designed to burn full on for lift off, or full off for coasting through space. A liquid oxygen/hydrogen pump fed

engine developed to demonstrate technologies for space vehicles has been able to achieve throttling capability. The engine was able to throttle from full power to 10% of its thrust capability. This is necessary to allow the spacecraft ample propulsion and also control to land on the Moon's and Martian surfaces.

CASI

Hydrogen Oxygen Engines; Spacecraft Propulsion; Throttling; Fuel Pumps; Variable Thrust; Thrust Control; Propulsion System Performance

24

COMPOSITE MATERIALS

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

20080009615 NASA Marshall Space Flight Center, Huntsville, AL, USA

Containerless Processing of a Lithium Disilicate Glass

Ranasinghe, K. S.; Ray, C. S.; Day, D. E.; Rogers, J. R.; Hyers, R. W.; Rathz, T.; January 2006; 1 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

Glasses of $\text{Li}_2\text{O}\cdot 2\text{SiO}_2$ (LS2) and LS2 doped with 0.001 wt% platinum (LS2 + 0.001 wt% Pt) compositions were melted, cooled and re-heated at controlled rates while levitated (containerless) inside an Electrostatic Levitator (ESL) furnace at NASA Marshall Space Flight Center. The experiments were conducted in vacuum using spherical 2.5 - 3.0 mm diameter glass samples. The measured critical cooling rate for glass formation, R_c , for the LS2 and LS2 + 0.001 wt% Pt glasses processed at ESL were 14 plus or minus 2 C/min and 130 plus or minus 5 C/min, respectively. The values of R_c for the same LS2 and LS2 + 0.001 wt% Pt glasses processed in a container were 62 plus or minus 3 C/min and 162 plus or minus 5 C/min, respectively. The effective activation energy for crystallization, E , for the LS2 glass processed without a container at ESL was higher than that for an identical glass processed in a container. These results suggest that the glass formation tendency for a containerless LS2 melt is significantly increased compared to an identical melt in contact with a container. The absence of heterogeneous nucleation sites that are inherently present in all melts held in containers is believed to be the reason for the increased glass forming tendency of this containerless melt.

Author

Lithium; Silicates; Containerless Melts; E Glass; Silicon Dioxide

20080009644 NASA, Washington, DC USA

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method

Sullivan, Thomas A., Inventor; September 18, 2007; 10 pp.; In English

Patent Info.: Filed November 4, 2004; US-Patent-7,270,851; US-Patent-Appl-SN-10/985,081; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009644>

A method for increasing the compressive modulus of aerogels comprising: providing aerogel substrate comprising a bubble matrix in a chamber; providing monomer to the chamber, the monomer comprising vapor phase monomer which polymerizes substantially free of polymerization byproducts; depositing monomer from the vapor phase onto the surface of the aerogel substrate under deposition conditions effective to produce a vapor pressure sufficient to cause the vapor phase monomer to penetrate into the bubble matrix and deposit onto the surface of the aerogel substrate, producing a substantially uniform monomer film; and, polymerizing the substantially uniform monomer film under polymerization conditions effective to produce polymer coated aerogel comprising a substantially uniform polymer coating substantially free of polymerization byproducts. Polymer coated aerogel comprising aerogel substrate comprising a substantially uniform polymer coating, said polymer coated aerogel comprising porosity and having a compressive modulus greater than the compressive modulus of the aerogel substrate, as measured by a 100 lb. load cell at 1 mm/minute in the linear range of 20% to 40% compression.

Official Gazette of the U.S. Patent and Trademark Office

Aerogels; Capsules; Nanofabrication; Compressibility; Polymers; Coatings

20080009664 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate

Fuss, T.; Ray, C. S.; Leshner, C. E.; Day, D. E.; [2006]; 1 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: Other Sources; Abstract Only

Crystallization of a $\text{Li}_2\text{O}\cdot 2\text{SiO}_2$ (LS2) glass subjected to a uniform hydrostatic pressure of 4.5 GPa and 6 GPa was

investigated up to a temperature of 750 C. The density of the compressed glass is about 2% greater at 4.5 GPa than at 1 atm and, depending upon the processing temperature, up to 10% greater at 6 GPa. Crystal growth rates investigated as a function of temperature and pressure show that lithium disilicate crystal growth is an order of magnitude slower at 4.5 GPa than 1 atm resulting in a shift of +45 C (plus or minus 10 C) in the growth rate curve at high pressure compared to 1 atm condition. At 6 GPa lithium disilicate crystallization is suppressed entirely, while a new high pressure lithium metasilicate crystallizes at temperatures 95 C (plus or minus 10 C) higher than those reported for lithium disilicate crystallization at 1 atm. The decrease in crystal growth rate with increasing pressure for lithium disilicate glass up to 750 C is related to an increase in viscosity with pressure associated with fundamental changes in glass structure accommodating densification.

Author

Crystallization; Lithium; Silicates; Glass; Pressure Effects

20080009742 NASA Langley Research Center, Hampton, VA, USA

Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same

Yorktown, Ji Su, Inventor; Huang, Ngan Fong, Inventor; August 07, 2007; 12 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 25 Jul. 2005; US-Patent-7,252,884; US-Patent-Appl-SN-11/190212; NASA-Case-LAR-16386-1; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009742>

A solid carbon has CNTs dispersed therein and is formed about three-dimensionally ordered spherical voids arranged in an opal-like lattice.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Fabrication; Porosity; Reinforcing Materials

20080009747 NASA Ames Research Center, Moffett Field, CA, USA

Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites

Li, Jun, Inventor; Meyyappan, Meyya, Inventor; September 25, 2007; 16 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 13 Apr. 2004; US-Patent-7,273,095; US-Patent-Appl-SN-10/825795; NASA-Case-ARC-15173-1; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009747>

A method for providing for thermal conduction using an array of carbon nanotubes (CNTs). An array of vertically oriented CNTs is grown on a substrate having high thermal conductivity, and interstitial regions between adjacent CNTs in the array are partly or wholly filled with a filler material having a high thermal conductivity so that at least one end of each CNT is exposed. The exposed end of each CNT is pressed against a surface of an object from which heat is to be removed. The CNT-filler composite adjacent to the substrate provides improved mechanical strength to anchor CNTs in place and also serves as a heat spreader to improve diffusion of heat flux from the smaller volume (CNTs) to a larger heat sink.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Thermal Conductivity; Composite Materials; Nanotechnology

20080009771 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Process for Self-Repair of Insulation Material

Parrish, Clyde F., Inventor; October 23, 2007; 8 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 8 Oct. 2003; US-Patent-7,285,306; US-Patent-Appl-SN-10/684064; US-Patent-Appl-SN-60/464050; NASA-Case-KSC-12539; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009771>

A self-healing system for an insulation material initiates a self-repair process by rupturing a plurality of microcapsules disposed on the insulation material. When the plurality of microcapsules are ruptured reactants within the plurality of microcapsules react to form a replacement polymer in a break of the insulation material. This self-healing system has the ability to repair multiple breaks in a length of insulation material without exhausting the repair properties of the material.

Official Gazette of the U.S. Patent and Trademark Office

Self Repairing Devices; Composite Materials; Capsules; Insulation

20080010687 NASA Glenn Research Center, Cleveland, OH, USA

Stress Analysis and Fracture in Nanolaminate Composites

Chamis, Christos C.; January 2008; 25 pp.; In English; SAMPE 2007, 3-7 Jun. 2007, Baltimore, MD, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 561581.02.08.03.15.03

Report No.(s): NASA/TM-2008-214928; E-15841; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010687>

A stress analysis is performed on a nanolaminate subjected to bending. A composite mechanics computer code that is based on constituent properties and nanoelement formulation is used to evaluate the nanolaminate stresses. The results indicate that the computer code is sufficient for the analysis. The results also show that when a stress concentration is present, the nanolaminate stresses exceed their corresponding matrix-dominated strengths and the nanofiber fracture strength.

Author

Nanocomposites; Fracture Strength; Stress Analysis; Matrix Materials; Stress Concentration; Nanostructure (Characteristics); Fracturing

20080010850 NASA Glenn Research Center, Cleveland, OH, USA

Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment

Ghosn, Louis J.; Zhu, Dongming; January 2008; 16 pp.; In English; 48th Structures, Structural Dynamics, and Materials Conference, 23-26 Apr. 2007, Waikiki, HI, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 984754.02.07.03.16.03

Report No.(s): NASA/TM-2008-214915; AIAA Paper 2007-2070; ARL-TR-4367; E-16101; Copyright; Avail.: CASI: A03, Hardcopy

Pulse detonation engine (PDE) concepts are receiving increasing attention for future aeronautic propulsion applications, due to their potential thermodynamic cycle efficiency and higher thrust to density ratio that lead to the decrease in fuel consumption. But the resulting high gas temperature and pressure fluctuation distributions at high frequency generated with every detonation are viewed to be detrimental to the combustor liner material. Experimental studies on a typical metal combustion material exposed to a laser simulated pulse heating showed extensive surface cracking. Coating of the combustor materials with low thermal conductivity ceramics is shown to protect the metal substrate, reduce the thermal stresses, and hence increase the durability of the PDE combustor liner material. Furthermore, the temperature fluctuation and depth of penetration is observed to decrease with increasing the detonation frequency. A crack propagation rate in the coating is deduced by monitoring the variation of the coating apparent thermal conductivity with time that can be utilized as a health monitoring technique for the coating system under a rapid fluctuating heat flux.

Author

Combustion Chambers; Protective Coatings; Pulse Detonation Engines; Thermal Control Coatings; Engine Design; Crack Propagation

25

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*.

20080009630 University of Central Florida, Orlando, FL USA

Catalytic dehydrogenation of amine borane complexes

Mohajeri, Nahid, Inventor; Tabatabaie-Raissi, Ali, Inventor; October 23, 2007; 17 pp.; In English

Contract(s)/Grant(s): NAG3-2751

Patent Info.: Filed April 28, 2006; US-Patent-7,285,142; US-Patent-Appl-SN-11/414,572; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009630>

A method of generating hydrogen includes the steps of providing an amine borane (AB) complex, at least one hydrogen generation catalyst, and a solvent, and mixing these components. Hydrogen is generated. The hydrogen produced is high purity hydrogen suitable for PEM fuel cells. A hydrolytic in-situ hydrogen generator includes a first compartment that contains an

amine borane (AB) complex, a second container including at least one hydrogen generation catalyst, wherein the first or second compartment includes water or other hydroxyl group containing solvent. A connecting network permits mixing contents in the first compartment with contents in the second compartment, wherein high purity hydrogen is generated upon mixing. At least one flow controller is provided for controlling a flow rate of the catalyst or AB complex.

Official Gazette of the U.S. Patent and Trademark Office

Amines; Boranes; Catalysts; Dehydrogenation; Hydrogen; Solvents

20080009749 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures

Quinn, Jacqueline, Inventor; Clausen, Christian, Inventor; Geiger, Cherie L., Inventor; Coon, Christina, Inventor; Berger, Cristina M., Inventor; Filipek, Laura B., Inventor; Milum, Kristen M., Inventor; September 18, 2007; 6 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 27 Oct. 2004; US-Patent-7,271,199; US-Patent-Appl-SN-10/977622; US-Patent-Appl-SN-60/523656; NASA-Case-KSC-12637; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009749>

Emulsified systems or a surfactant-stabilized, biodegradable water-in-solvent emulsion with bimetallic particles contained with the emulsion droplets are useful at removing PCBs from ex situ structures. The hydrophobic emulsion system draws PCBs through the solvent/surfactant membrane. Once inside the membrane, the PCBs diffuse into the bimetallic particles and undergo degradation. The PCBs continue to enter, diffuse, degrade, and biphenyl will exit the particle maintaining a concentration gradient across the membrane and maintaining a driving force of the reaction.

Author

Bimetallics; Biodegradability; Emulsions; Polychlorinated Biphenyls; Environmental Cleanup; Decontamination; Water Treatment

20080009756 NASA Langley Research Center, Hampton, VA, USA

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations

Zambon, A. C.; Chelliah, H. K.; Drummond, J. P.; August 06, 2006; 1 pp.; In English; 31st International Symposium on Combustion, 6-11 Aug. 2006, Heidelberg, Germany; Original contains color illustrations

Contract(s)/Grant(s): WBS 599489.02.07.07.01

Report No.(s): Paper No. 2E12; Copyright; Avail.: CASI: [A01](#), Hardcopy

Large-scale simulations of multi-dimensional unsteady turbulent reacting flows with detailed chemistry and transport can be computationally extremely intensive even on distributed computing architectures. With the development of suitable reduced chemical kinetic models, the number of scalar variables to be integrated can be decreased, leading to a significant reduction in the computational time required for the simulation with limited loss of accuracy in the results. A general MATLAB-based automated mechanism reduction procedure is presented to reduce any complex starting mechanism (detailed or skeletal) with minimal human intervention. Based on the application of the quasi steady-state (QSS) approximation for certain chemical species and on the elimination of the fast reaction rates in the mechanism, several comprehensive reduced models, capable of handling different fuels such as C₂H₄, CH₄ and H₂, have been developed and thoroughly tested for several combustion problems (ignition, propagation and extinction) and physical conditions (reactant compositions, temperatures, and pressures). A key feature of the present reduction procedure is the explicit solution of the concentrations of the QSS species, needed for the evaluation of the elementary reaction rates. In contrast, previous approaches relied on an implicit solution due to the strong coupling between QSS species, requiring computationally expensive inner iterations. A novel algorithm, based on the definition of a QSS species coupling matrix, is presented to (i) introduce appropriate truncations to the QSS algebraic relations and (ii) identify the optimal sequence for the explicit solution of the concentration of the QSS species. With the automatic generation of the relevant source code, the resulting reduced models can be readily implemented into numerical codes.

Derived from text

Reacting Flow; Shear Layers; Simulation; Models; Reaction Kinetics

20080009855 Air Force Research Lab., Edwards AFB, CA USA

Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint)

Shackelford, S A; Menapace, J A; Goldman, J F; May 29, 2007; 62 pp.; In English

Contract(s)/Grant(s): Proj-50260541

Report No.(s): AD-A475330; AFRL-PR-ED-JA-2007-303; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475330>

Global kinetics for the liquid state thermochemical decomposition of neat 1,3,5,5-tetranitrohexahydropyrimidine (DNNC), perdeuterio-labeled DNNC-d6, and partially deuterium-labeled DNNC-d2 and DNNC-d4 isotopomers were obtained by isothermal differential scanning calorimetry (IDSC). Molecular kinetic deuterium isotope effect (KDIE) values obtained with DNNC and DNNC-d6 from 174 to 194 oC revealed that C-H bond rupture regulates both an endothermic catalytic initiation and the exothermic propagation of the liquid thermochemical decomposition process. Using IDSC-based KDIE comparisons with the DNNC-d2, DNNC-d4, and DNNC-d6 isotopomers, a more detailed chemical structure/mechanistic relationship emerged by entering the interior of the DNNC molecule. Here structural kinetic KDIE results showed the rate-controlling C-H bond rupture has its origin at the non-equivalent C-2 methylene group sandwiched between the two nitrated DNNC nitrogen ring atoms, versus at the chemically equivalent C-4 and C-6 methylene ring positions located elsewhere in the DNNC molecule. Elucidation of such mechanistic features should aid in the structural design of new high energy compounds with improved thermochemical properties. A 170.0 kJ/mol activation energy appeared for the endothermic induction period, and a lower 104.2 kJ/mol activation energy was determined for the exothermic acceleratory portion of the DNNC decomposition process. The global liquid and solid state thermochemical decomposition processes for DNNC are compared.

DTIC

Decomposition; Deuterium; Heat Measurement; Isotopes; Structural Engineering; Thermochemistry

20080009862 Oregon State Univ., Corvallis, OR USA

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory

Benoit-Bird, Kelly J; Schofield, Oscar; Jones, Christopher D; Condiotty, Jeff; Jan 2006; 12 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0652; N00014-05-1-0650

Report No.(s): AD-A475355; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475355>

Fish aggregation is important in terms of biology, fisheries, and measurement, quantitative analyses of gregarious movement behaviors remain relatively rare (Turchin 1989). Fish aggregation has most often been studied in easily accessed fish or fish easily maintained in the laboratory such as minnows and dace (see a review in Pitcher and Parrish 1993). Measurements of fish aggregations are often difficult, particularly in pelagic environments. Our goal is to develop new acoustic techniques that have the potential to serve as measurement tools to quantify this ubiquitous and important behavior. This project brings together a team with expertise in acoustics, engineering, biology, fisheries, and oceanography to develop and apply acoustic techniques to measure schooling in pelagic fish.

DTIC

Acoustics; Fishes; Observatories; Oceans; Quantitative Analysis

20080009948 Maryland Univ., College Park, MD USA

Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance

Alexander, Millard H; Dagdigian, Paul J; Mar 25, 2007; 17 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0152; FA9550-04-1-0103

Report No.(s): AD-A475481; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Collisional relaxation of the atmospherically important free radicals OH and NO by open-shell atoms have been studied in a coordinated theoretical and experimental investigation. A quantum statistical method has been employed to describe collisional processes proceeding through a strongly bound collision complex, such as occur in the interaction of many free radicals with atoms. This theory has been used to compute rotationally and vibrationally inelastic collision rates for collisions of OH with H atoms. Similar calculations for collisions on the lowest potential energy surfaces for OH-O collisions have been carried out, with good agreement with the accompanying experiments. In these experiments, the rate constants for total

removal OH($v=1$) molecules by O(3P) and N(4S) atoms have been measured in a discharge-flow experiment.
DTIC

Atmospherics; Collisions; Energy Transfer; Free Radicals

20080009954 Dayton Univ., OH USA

Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint)

DiRocco, Christopher; Powers, Peter; Gillen, Glen D; Guha, Shekhar; Jan 2006; 5 pp.; In English

Contract(s)/Grant(s): Proj-4348

Report No.(s): AD-A475493; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We demonstrate the use of interferometric techniques to measure the temperature dependence of the index of refraction and thermo-optic coefficient of infrared wafer-shaped optical materials, and report our results for InAs and InSb.

DTIC

Indium Antimonides; Indium Arsenides; Refractivity; Temperature Dependence

20080009971 Colorado Univ., Boulder, CO USA

Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts)

Gin, Douglas L; Dec 20, 2007; 12 pp.; In English

Contract(s)/Grant(s): N00014-07-1-0544; Proj-07PR06941-00

Report No.(s): AD-A475541; ONR-2007-01; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This grant was used to provide partial travel assistance for 5 invited speakers for a POLY Division symposium titled 'Polymers and Liquid Crystals' at the Fall 2007 ACS National Meeting in Boston, MA (Aug. 19-23, 2007). The co-organizers of this symposium were the Pt (CU Boulder) and Prof. C. Allan Guymon (University of Iowa). The focus of this symposium was to showcase new research and application directions in the area of liquid crystal (LC)-containing and LC-based polymer systems. LCs provide the ability to readily control order and anisotropy in polymer materials, and thereby amplify or modify specific properties. LC components also offer the ability to control polymer architecture on the nanometer scale to generate organic nanomaterials with enhanced chemical and physical properties. Such materials are of direct interest to the ONR because of their promise as new types of functional coatings, enhanced water purification membranes, catalysts, tissue engineering scaffolds, and micro-actuators for advanced, future U.S. Navy operations.

DTIC

Abstracts; Conferences; Liquid Crystals; Polymers

20080009974 Army Research Lab., Adelphi, MD USA

Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon

Morgan, Brian; Taylor, Patrick; Jan 2008; 18 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475544; ARL-TR-4351; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Bi₂Te₃-based thermoelectric (TE) energy conversion devices are an attractive possibility for recovering usable energy from waste heat. The integration of TE devices on silicon substrates opens the door for new highly integrated systems where micro-electro-mechanical systems (MEMS) heat exchangers and sensor/actuator technology can be leveraged to improve conversion efficiency and system capability. One roadblock on this path is the development of reliable patterning methods for fabricating thin-film TE devices on silicon micromachined substrates. This report gives the results from investigating patterning techniques for polycrystalline Bi₂Te₃ films grown using molecular beam epitaxy (MBE). Lithographic patterning and both wet and dry etch techniques are discussed. Results show that the developed processes can be used to precisely pattern features smaller than 10 microns on a side and are scalable to vertical dimensions (\gg or $>$) 10 microns.

DTIC

Energy Conversion; Microelectromechanical Systems; Polycrystals; Silicon; Thermoelectricity; Thin Films

20080009977 Kyungpook National Univ., Daegu, Japan

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites

Park, Soo-Young; Jan 15, 2008; 32 pp.; In English

Contract(s)/Grant(s): FA5209-06-P-0061

Report No.(s): AD-A475553; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Multi-walled carbon nanotube 'MWNT' /gelatin composites by dispersion of MWNT through ultrasonication in an

aqueous medium with anionic surfactant sodium dodecyl sulfate 'SDS'. The swelling behavior and the bending mechanism of the composite and pure gelatin films were studied in order to clarify the potential use of MWNT in the gelatin actuator. The response of the composite and pure hydrogel to the applied electrical field in the NaCl aqueous solution was investigated. Both of the composite and pure hydrogel showed a two-stage bending phenomenon, an early bending towards the anode and a later bending to towards the cathode. An investigation of the mechanism of this bending phenomenon was performed based on osmotic pressure difference at the inter-phase between the hydrogel film and salt solution. The swelling behavior of the composite was studied by immersion of the vacuum-dried gels samples into a 0.1 M NaCl aqueous solution at room temperature. The incorporation of MWNT gradually decreased the swelling of the hydrogel and exerted no effect on the swelling mechanism which followed the second order kinetic. Both the bound and unbound water contents 'measured from DSC' decreased with the addition of MWNT. This phenomenon might be due to the hydrophobic effect of the MWNT and increase in crosslinking density by increasing the MWNT concentration.

DTIC

Carbon Nanotubes; Electric Fields; Electromechanical Devices; Electromechanics; Gelatins; Hydrophobicity; Nanocomposites

20080009989 Massachusetts Inst. of Tech., Cambridge, MA USA

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3

Stanley, Rachel H R; Sep 2007; 227 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): OCE-0221247

Report No.(s): AD-A475577; MIT/WHOI-2007-20; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The five noble gases (helium, neon, argon, krypton, and xenon) are biologically and chemically inert, making them ideal oceanographic tracers. Additionally, the noble gases have a wide range of solubilities and molecular diffusivities, and thus respond differently to physical forcing. Tritium, an isotope of hydrogen, is useful in tandem with its daughter helium-3 as a tracer for water mass ages. In this thesis, a fourteen month time-series of the five noble gases, helium-3 and tritium was measured at the Bermuda Atlantic Time-series Study (BATS) site. The time-series of five noble gases was used to develop a parameterization of air-sea gas exchange for oligotrophic waters and wind speeds between 0 and 13 m (s⁻¹) that explicitly includes bubble processes and that constrains diffusive gas exchange to + or minus 6% and complete and partial air injection processes to plus or minus 15%. Additionally, the parameterization is based on weeks to seasonal time scales, matching the time scales of many relevant biogeochemical cycles. The time-series of helium isotopes, tritium, argon, and oxygen was used to constrain upper ocean biological production. Specifically, the helium flux gauge technique was used to estimate new production, apparent oxygen utilization rates were used to quantify export production, and euphotic zone seasonal cycles of oxygen and argon were used to determine net community production. The concurrent use of these three methods allows examination of the relationship between the types of production and begins to address a number of apparent inconsistencies in the elemental budgets of carbon, oxygen, and nitrogen.

DTIC

Air Water Interactions; Gas Exchange; Gases; Helium; Helium Isotopes; Oceans; Rare Gases

20080010721 McGill Univ., Montreal, Quebec Canada

Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines

Higgins, Andrew; Jan 2004; 104 pp.; In English

Report No.(s): AD-A475359; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475359>

The initiation of detonation in hydrocarbon fuel-air mixtures and the effect initiation has on performance are two key issues for the assessment and progress of Pulse Detonation Engines. This report presents the results of experimental studies into the initiation of detonation and the impact of initiation on the impulse generated in a single-cycle Pulse Detonation Engine. In order to facilitate the prompt initiation of detonation, a number of chemical sensitizers were considered (nitrates, nitrogen dioxide, peroxides). None of these were shown to have a significant sensitizing effect, as quantified either by the run-up distance to detonation or by the detonation veil size. Partial reforming of the fuel/oxygen mixture via the 'cool flame' process was shown to have a significant sensitizing effect, reducing the run-up distance by a factor of two and the cell size by a factor of three. This effect was transient, in that it was only observed immediately prior to the onset of cool flame. The ability to initiate an unsensitized fuel-air mixture via a turbulent jet of combustion products was demonstrated in two different facilities at different scales. Different techniques of creating a nearly instantaneous constant volume explosion in a pre-combustion chamber were investigated. These techniques were then used to drive a turbulent jet of combustion products

through orifices of different geometries. The use of flame tubes was shown to be highly effective in creating constant volume explosion pressures, and the use of an annular orifice to create a centrally focused jet was found to be the most effective orifice design. The scaling for jet initiation of detonation was determined in terms of the characteristic cell size.

DTIC

Detonation; Flame Temperature; Hydrocarbons; Jet Engines; Pulse Detonation Engines; Sensitizing

26

METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

20080009619 NASA Marshall Space Flight Center, Huntsville, AL, USA

A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future
Ding, Jeff; Carter, Bob; Lawless, Kirby; Nunes, Arthur; Russell, Carolyn; Suites, Michael; Schneider, Judy; [2006]; 8 pp.; In English

Contract(s)/Grant(s): 544-2700; 544-2700; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009619>

Welding at NASA's Marshall Space Flight Center (MSFC), Huntsville, Alabama, has taken a new direction through the last 10 years. Fusion welding processes, namely variable polarity plasma arc (VPPA) and tungsten inert gas (TIG) were once the corner stone of welding development in the Space Flight Center's welding laboratories, located in the part of MSFC known as National Center for Advanced Manufacturing (NCM). Developed specifically to support the Shuttle Program's External Tank and later International Space Station manufacturing programs, was viewed as the paragon of welding processes for joining aluminum alloys. Much has changed since 1994, however, when NASA's Jeff Ding brought the FSW process to the NASA agency. Although, at that time, FSW was little more than a 'lab curiosity', NASA researchers started investigating where the FSW process would best fit NASA manufacturing programs. A laboratory FSW system was procured and the first welds were made in fall of 1995. The small initial investment NASA made into the first FSW system has certainly paid off for the NASA agency in terms of cost savings, hardware quality and notoriety. FSW is now a part of Shuttle External Tank (ET) production and the preferred weld process for the manufacturing of components for the new Crew Launch Vehicle (CLV) and Heavy Lift Launch Vehicle (HLLV) that will take this country back to the moon. It is one of the solid state welding processes being considered for on-orbit space welding and repair, and is of considerable interest for Department of Defense (@OD) manufacturing programs. MSFC involvement in these and other programs makes NASA a driving force in this country's development of FSW and other solid state welding technologies. Now, a decade later, almost the entire on-going welding R&D at MSFC now focuses on FSW and other more advanced solid state welding processes.

Author

Friction Stir Welding; Welded Joints; Plasmas (Physics); NASA Programs; Laboratory Equipment; Gas Tungsten Arc Welding; External Tanks; Aluminum Alloys; Fusion Welding

20080009741 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline

Viswanathan, Tito, Inventor; February 20, 2007; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 26 Aug. 2005; US-Patent-7,179,404; US-Patent-Appl-SN-11/215205; US-Patent-Appl-SN-09/930260; US-Patent-Appl-SN-60/217493; NASA-Case-KSC-12191-1; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009741>

The invention provides coatings useful for preventing corrosion of metals. The coatings comprise a film-forming resin and conductive polymers comprising linearly conjugated x-systems and residues of sulfonated lignin or a sulfonated polyflavonoid or derivatives of sulfonated lignin or a sulfonated polyflavonoid. The invention also provides a latex formulation of the coatings, and articles of manufacture comprising a metal substrate and a coating in contact with the metal substrate.

Author

Cold Rolling; Corrosion Prevention; Doped Crystals; Lignin; Steels; Coatings

20080009750 NASA Glenn Research Center, Cleveland, OH, USA

Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils

MacKay, Rebecca A., Inventor; Gabb, Timothy P., Inventor; Smialek, James L., Inventor; Nathal, Michael V., Inventor; August 28, 2007; 9 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 22 Sep. 2004; US-Patent-7,261,783; US-Patent-Appl-SN-10/946286; NASA-Case-LEW-17672-1; No Copyright; Avail.: CASI: A02, Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080009750>

A nickel-base superalloy article for use in turbines has increased creep resistance and lower density. The superalloy article includes, as measured in % by weight, 6.0-12.0% Mo, 5.5-6.5% Al, 3.0-7.0% Ta, 0-15% Co, 2.0-6.0% Cr, 1.0-4.0% Re, 0-1.5% W, 0-1.5% Ru, 0-2.0% Ti, 0-3.0% Nb, 0-0.2% Hf, 0-0.02% Y, 0.001-0.005% B, 0.01-0.04% C, and a remainder including nickel plus impurities.

Author

Airfoils; Creep Strength; Single Crystals; Nickel Alloys; Turbines; Low Density Materials; Density (Mass/Volume)

20080009949 Wisconsin Univ., Madison, WI USA

Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components

Crone, Wendy C; Ellis, Arthur B; Perepezko, John H; Dec 2007; 19 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0109

Report No.(s): AD-A475482; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Methods for fabricating adaptive composite materials and components using shape memory alloy (SMA) constituents were investigated using a variety of fabrication techniques, including mechanical rolling methods. Both SMA-polymer and SMA-metal composites were created, as well as new fabrication strategies for producing NiTi and CuAlNi shape memory alloy particles with refined size which still display shape memory and pseudoelasticity. The composite materials show promising fracture toughness behavior. The functionalization strategy we developed for improving adhesion between a shape memory alloy constituents in a polymeric matrix provides tunable control over the interface. Additionally, related work on the manipulation and control of the motion of individual liberated nanowires using nickel end caps and magnetic fields has allowed us to achieve sample positioning for characterization and optical switching behavior.

DTIC

Composite Materials; Nanostructures (Devices); Shape Memory Alloys; Shapes

20080009950 Drexel Univ., Philadelphia, PA USA

Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys

Kalidindi, Surya R; Doherty, Roger D; Hovanec, Christopher J; Donohue, Brendon R; VanderMeulen, Ryan J; May 31, 2007; 19 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0018

Report No.(s): AD-A475483; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A combined experimental and modeling study has been carried out to characterize the structure and mechanical properties of severely plastically deformed (SPD) aluminum and its alloys as well as the effect of strengthening mechanism on fracture toughness and failure mode. This investigation is focused specifically on Equal Channel Angular Pressing (ECAP) and heavy cold rolling of high solute Al alloys. A particular reason for studying the high strength potentially achievable by these routes is the expectation that since the fracture toughness of precipitation hardened aluminum alloys is known to be degraded by grain boundary precipitates, the high strengths achievable by strain hardening without precipitation has a reasonable prospect of yielding a higher combination of yield strength and toughness than by conventional precipitation hardening. In this study it has been shown that SPD processing of high solute Al alloys can be carried out to higher strains before strain localization occurs if mechanical stress relieving is done prior to processing and that strengths unobtainable through precipitation hardening can readily be achieved by strain hardening. The effect of natural aging on strain hardening has been investigated and found to be a significant factor in the rate at which the flow stress increases with increasing plastic strain. It has been shown that strain hardened Al alloys are more ductile and exhibit higher strain hardening rates than precipitation hardened alloys at equivalent strengths and that strain hardening is a viable processing route for improving toughness. On the modeling side, we have developed new micromechanical finite element models that employ crystal plasticity constitutive framework and are able to successfully simulate texture evolution in the sample during complex routes of ECAP.

DTIC

Aluminum Alloys; Mechanical Properties; Microstructure; Plastic Deformation

20080010671 NASA Johnson Space Center, Houston, TX, USA

An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints

Hatamleh, Omar; DeWald, Adrian; [2008]; 21 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Surface treatment processes including laser and shot peening were applied to friction stir welded samples fabricated using 2195 and 7075 aluminum alloys. Surface residual stress measurements on these samples were made using x-ray diffraction. Measurements of the through thickness bulk residual stresses were obtained using the contour method. The deepest compressive residual stresses were obtained with multiple layers of laser peening. Interestingly, laser peening was shown to have less of an effect on residual stress near the edges of the weld joint where significant softening occurred.

Author

Aluminum Alloys; Fabrication; Friction Stir Welding; Metal Joints; Residual Stress; Metallography

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*.

20080009629 NASA, Washington, DC USA

Process for self-repair of insulation material

Parrish, Clyde F., Inventor; October 23, 2007; 8 pp.; In English

Patent Info.: Filed October 8, 2003; US-Patent-7,285,306; US-Patent-Appl-SN-10/684,064; No Copyright; Avail.: CASI:

A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009629>

A self-healing system for an insulation material initiates a self-repair process by rupturing a plurality of microcapsules disposed on the insulation material. When the plurality of microcapsules are ruptured reactants within the plurality of microcapsules react to form a replacement polymer in a break of the insulation material. This self-healing system has the ability to repair multiple breaks in a length of insulation material without exhausting the repair properties of the material.

Official Gazette of the U.S. Patent and Trademark Office

Insulation; Rupturing; Wear Resistance; Capsules

20080009734 NASA Johnson Space Center, Houston, TX, USA; Johns Hopkins Univ., Laurel, MD, USA; NASA Goddard Space Flight Center, Greenbelt, MD, USA; NASA Ames Research Center, Moffett Field, CA, USA

Development of Improved Aerogels for Spacecraft Hypervelocity Capture

Lisse, C. M.; Cheng, A. F.; Chabot, N. L.; Dello Russo, N.; Satcher, J. H.; Zolensky, M. E.; Cintala, M. J.; Glavin, D. P.; Sandford, S. A.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The highly successful NASA Discovery mission Stardust became the first mission to return samples to Earth from a known comet in January 2006 [1]. The samples were captured during a flyby of comet 81P/Wild2 using aerogel, a very low density, silica (SiO₂)-based solid with a highly porous structure [2]. Currently, scientists around the world are studying the cometary particles returned by Stardust and reporting fascinating discoveries about the history of comets and the evolution of our solar system. Given the widely acknowledged success of the Stardust mission, additional comet sample return missions are attractive and competitive concepts for future NASA Discovery-class missions; in particular, additional comet sample return missions will allow the first laboratory studies to investigate the naturally occurring diversity among comets, a crucial scientific question for understanding not just the formation of comets but also the very nature of the early solar system. Though Stardust was highly successful, there are important lessons learned from the mission on which advances in aerogel technology can be based

Derived from text

Aerogels; Stardust Mission; Silicon Dioxide; Evolution (Development); NASA Programs; Sample Return Missions; Flyby Missions

20080009888 Applied Research Associates, Inc., Albuquerque, NM USA

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids

Grady, Dennis E; Jul 2007; 48 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W56HZV-05-P-L682; Proj-17168

Report No.(s): AD-A475436; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475436>

Ceramics based on composition of the light intermetallic compounds, have demonstrated considerable success as a barrier material in armor applications. The exceptional strength-to-density ratio of ceramic plays a crucial role in the positive performance of ceramics in the terminal ballistic environment. Even the higher density ceramics, such as tungsten based materials, show promising behavior in space-limited armor applications. The implementation, optimization and evaluation of ceramic in armor systems benefit from the rapidly growing power of computational analysis and simulation. Production codes such as EPIC, CTH, ALE-3D, among others, are making large strides toward the accurate and efficient simulations of the wide-ranging armor and anti-armor applications of concern. Central to the confident computational simulation of the performance of ceramics in the terminal ballistic environment is, of course, material response models, which describe the character of the failed and comminuted ceramic including fragment size and distribution.

DTIC

Brittleness; Ceramics; Failure; Intermetallics; Solids; Terminal Ballistics

20080009943 Washington Univ., Seattle, WA USA

High Mobility Conjugated Polymers

Jenekhe, Samson A; Oct 20, 2007; 22 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0162

Report No.(s): AD-A475466; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The performance of all current polymer electronic devices, such as organic field-effect transistors (OFETs), photovoltaic cells, and photodetectors, is limited primarily by the low charge carrier mobilities of current materials. To address this problem this project investigated various polymer semiconductors exhibiting high carrier mobilities and explored their device applications in electronics, optoelectronics, and nanoelectronics. Field-effect electron mobilities as high as 0.1 sq cm/Vs in a spin coated thin films of ladder poly(benzobisimidazobenzophenanthroline) (BBL) were observed. This electron mobility is the highest observed to date in a conjugated polymer semiconductor and was found to vary strongly with intrinsic viscosity (or molecular weight) of the polymer while very stable in air and oxygen. We successfully fabricated and demonstrated a complementary all-polymer inverter for the first time, using p- type poly(3-hexylthiophene) and BBL. A new class of ladder-type bisindoloquinoline semiconductors showing a mobility of 1.0cm²/v.s was synthesized. Ambipolar OFETs were achieved from various p- and n-polymer blends. The field-effect mobility of holes in regioregular poly(3-alkylthiophene)s was found to exhibit a non-monotonic dependence on alkyl chain length, showing a maximum mobility with hexyl. Fundamental insights into the structural factors that govern high mobility charge transport and recombination in polymer semiconductors were also achieved.

DTIC

Conjugation; Electron Mobility; Field Effect Transistors; High Polymers; Mobility; Photovoltaic Effect

20080010795 Trinity Western Univ., Langley, British Columbia Canada

Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers

Van Dyke, J D; Gnatowski, Marek; Nov 2004; 48 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475504; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The report presents work on five types of dynamically vulcanized thermoplastic rubber blends made from chlorobutyl and nitrile rubbers and polypropylene, nylon 12, and PPT resins. The project objective was to establish a correlation between blend composition and properties such as microstructure swelling index, tensile strength, elongation at break, hardness, and resistance to penetration/re-emission of chemical warfare agents. The method of blend preparation and materials testing was described. Results were reviewed and conclusions were drawn. The results confirm that dynamic vulcanization can produce a variety of rubber plastic blends, many with elastomeric properties. Both rubber and plastic phases seems to be affected during the dynamic vulcanization process. Under exposure to solvents, both vulcanized rubber and rubber/plastic blends underwent a rapid approach to equilibrium swelling. It was found that swelling index values of blends were significantly less than the expected 'theoretical' values, based strictly on composition in the blend. This was attributed to a caging effect of the thermoplastic phase on the rubber phase at the higher thermoplastic composition. In blends of rubber and thermoplastic, the minimum elongation at break seems to be reached at phase inversion. With respect to re-emission values for the five blends

systems studied, from best to worst, the order is PA/CIIR > PP/CIIR > PA/NBR > PP/NBR > PBT/NBR. Selected results were presented during the IUPAC International Polymer Congress in Paris (July 4-8, 2004). Overheads from the presentation are enclosed with report.

DTIC

Plastics; Polyamide Resins; Polypropylene; Rubber; Swelling; Thermoplasticity; Vulcanizing

20080010847 NASA Marshall Space Flight Center, Huntsville, AL, USA

Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors

Aggarwal, Mohan D.; Kochary, F.; Penn, Benjamin G.; Miller, Jim; September 11, 2007; 8 pp.; In English; Structural Health Monitoring, 11-14 Sep. 2007, Stanford, CA, USA; Original contains black and white illustrations

Contract(s)/Grant(s): W9113M-04-C-0005; NNG06GC58A; NSF-HRD-0531183; Copyright; Avail.: CASI: A02, Hardcopy

There has been a growing interest in recent years in lead based perovskite ferroelectric and relaxor ferroelectric solid solutions because of their excellent dielectric, piezoelectric and electrostrictive properties that make them very attractive for various sensing, actuating and structural health monitoring (SHM) applications. We are interested in the development of highly sensitive and efficient PMN-PT sensors based on large single crystals for the structural health monitoring of composite materials that may be used in future spacecrafts. Highly sensitive sensors are needed for detection of defects in these materials because they often tend to fail by distributed and interacting damage modes and much of the damage occurs beneath the top surface of the laminate and not detectable by visual inspection. Research is being carried out for various combinations of solid solutions for PMN-PT piezoelectric materials and bigger size crystals are being sought for improved sensor applications. Single crystals of this material are of interest for sensor applications because of their high piezoelectric coefficient (d_{33} greater than 1700 pC/N) and electromechanical coefficients (k_{33} greater than 0.90). For comparison, the commonly used piezoelectric ceramic lead zirconate titanate (PZT) has a d_{33} of about 600 pC/N and electromechanical coefficients k_{33} of about 0.75. At the present time, these piezoelectric relaxor crystals are grown by high temperature flux growth method and the size of these crystals are rather small ($\sim 3 \times 4 \times 5$ mm (exp 3)). In the present paper, we have attempted to grow bulk single crystals of PMN-PT in a 2 inch diameter platinum crucible and successfully grown a large size crystal of 67%PMN-33%PT using the vertical gradient freeze technique with no flux. Piezoelectric properties of the grown crystals are investigated. PMN-PT plates show excellent piezoelectric properties. Samples were poled under an applied electric field of 5 kV/cm. Dielectric properties at a frequency of 1 kHz are examined. The grown PMN-PT crystals show typical relaxor dielectric properties. Additionally, the thermal properties of the sample are tested. The results are in good agreement with those found in the literature and some are reported for the first time.

Author

Lead Titanates; Niobates; Magnesium Compounds; Single Crystals; Piezoelectric Crystals; Crystal Growth

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*.

20080009776 NASA Marshall Space Flight Center, Huntsville, AL, USA

Hydrogen Reduction of Ilmenite from Lunar Regolith

Ramachandran, N.; Willenberg, H.; Tom, M.; Volz, M. P.; Ray, C. S.; September 18, 2006; 1 pp.; In English; Space 2006, 18-21 Sep. 2006, San Jose, CA, USA

Contract(s)/Grant(s): NAS8-02096; No Copyright; Avail.: Other Sources; Abstract Only

Each ascent vehicle returning from the lunar surface with a crew vehicle will require several tons of fuel. Most architecture studies of lunar exploration vehicles use liquid oxygen for fuel, either for LOX/LH₂ or LOX/methane. Utilization of oxygen generated on the lunar surface saves mass launched from Earth, with a multiplication factor on the order of 4-5, e.g. production and utilization of 4 tons of lunar oxygen for the ascent vehicle saves 16-20 tons of initial mass in low Earth orbit (IMLEO). The paper discusses ongoing MSFC activity on oxygen production by hydrogen reduction of Ilmenite. Specifically the important project milestone is to develop the Technology Readiness Level for the generation of lunar oxygen for propellant production from 3 to 5. The paper will provide an overview of the processes for Oxygen Generation, Complete

Systems Architecture for a pilot lunar plant, experimental apparatus development and initial experimental results, and future directions.

Author

Hydrogen; Ilmenite; Lunar Resources; Lunar Rocks; Oxygen; Oxygen Production; Propellants; In Situ Resource Utilization

20080009980 Aerospace Corp., El Segundo, CA USA

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel

DeSain, John D; Curtiss, Thomas J; Cohen, Ronald B; Brady, Brian B; Frolik, Steven A; Oct 30, 2007; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8802-04-C-0001

Report No.(s): AD-A475559; TR-2008(8506)-1; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The burn rate of paraffin wax fuel was measured in air with and without addition of LiAlH₄. The paraffin wax was mixed with 7-24% LiAlH₄(lithium aluminum hydride) by weight. The wax was then molded into candles. The candles were lit in air, and the mass loss with time was recorded. The 24% LiAlH₄ was found to enhance the burn rate of the candles by a factor of 14. LiAlH₄ was found to be a suitable compound to consider as a potential additive to hybrid rocket motors. The paraffin wax/LiAlH₄ was stable under conditions where the wax was solidified, re-melted, and molded at 700 C. The hydrophobic paraffin wax was found to isolate the LiAlH₄ from reaction with both water vapor and upon submerging in liquid water. The paraffin wax/LiAlH₄ candles stored for over a month under atmospheric conditions were lit and burned similarly to freshly made candles. The addition of LiAlH₄ to paraffin wax could significantly increase the burn rate of the paraffin wax used in a hybrid motor.

DTIC

Additives; Burning Rate; Fuels; Hybrid Propellants; Lithium Aluminum Hydrides; Lithium Compounds; Paraffins; Rocket Propellants; Waxes

29

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*.

20080010625 NASA Johnson Space Center, Houston, TX, USA

Comparative Packaging Study

Perchonok, Michele; Antonini, David; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

This viewgraph presentation describes a comparative packaging study for use on long duration space missions. The topics include: 1) Purpose; 2) Deliverables; 3) Food Sample Selection; 4) Experimental Design Matrix; 5) Permeation Rate Comparison; and 6) Packaging Material Information.

CASI

Packaging; Films; Food Processing; Coatings

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*.

20080009631 NASA, Washington, DC USA

Cushion system for multi-use child safety seat

Dabney, Richard W., Inventor; Elrod, Susan V., Inventor; October 23, 2007; 7 pp.; In English

Patent Info.: Filed January 28, 2005; US-Patent-7,284,792; US-Patent-Appl-SN-11/047,342; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009631>

A cushion system for use with a child safety seat has a plurality of bladders assembled to form a seat cushion that

cooperates with the seat's safety harness. One or more sensors coupled to the safety harness sense tension therein and generate a signal indicative of the tension. Each of the bladders is individually pressurized by a pressurization system to define a support configuration of the seat cushion. The pressurization system is disabled when tension in the safety harness has attained a threshold level.

Official Gazette of the U.S. Patent and Trademark Office

Cushions; Inflatable Structures; Harnesses; Safety; Seats

20080009667 Chinese Inst. of Engineers, Taipei, Taiwan, Province of China

Journal of the Chinese Institute of Engineers, Volume 30, No. 4

Chen, Shi-Shuenn, Editor; Tsai, Hsien-Lung, Editor; Chern, Ing-Jyh, Editor; Lee, Liang-Sun, Editor; Young, Der-Liang, Editor; Pan, Ching-Tsai, Editor; Chen, Jean-Lien, Editor; Shieh, Ce-Kuen, Editor; Chao, Ching-Kong, Editor; Chang, Kai, Editor, et al.; June 2007; 224 pp.; In English; See also 20080009668 - 20080009684; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The Journal of the Chinese Institute of Engineers is presented. The contents include: 1) Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-KO Material; 2) Elastic Stability of I-Columns Subjected to Compressions and BI-Moments; 3) Equipment and Testing Procedures for Small Strain Triaxial Tests; 4) Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis; 5) Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003; 6) A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns; 7) An Optimization Model of Sewage Rehabilitation; 8) Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images; 9) A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique; 10) Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues; 11) Indexpro: An Efficient Protein Indexing System Based on Knot Theory; 12) A Sliding-Window Parallel Packet Switch for High-speed Networks; 13) Low Complexity Convolutional Codes of Rate $2/N$; 14) Design and implementation of a Flexible Function Access Control Tool for Web Applications; 15) A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK; 16) Universal Share for the Sharing of Multiple Images; and 17) Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment.

CASI

Engineering; Mathematical Models; Communication Networks; Telecommunication

20080009668 National Chiao Tung Univ., Hsinchu, Taiwan, Province of China

A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns

Weng, Cheng Chiang; Yen, Sheng I.; Wang, Huei Shun; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 621-633; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

Presented herein is a new design approach utilizing the concept of relative rigidity for the design of concrete-encased composite columns. The new approach takes into account the relative rigidity ratio (RRR) of the steel portion and the reinforced concrete (RC) portion in a composite column to calculate the axial loads shared by each of the participating materials. The proposed approach also adopts the concept of strength superposition to sum up the calculated flexural strengths of the steel and the RC portions in a composite column. By utilizing the concepts of 'relative rigidity' and 'strength superposition', it becomes feasible to combine the column design equations in the ACI-318 Code and the AISC-LRFD Specification to create a new design approach for composite columns. To evaluate the accuracy of this method, the column strengths predicted by the proposed approach are compared to the results calculated using a numerical fiber analysis and to the results of 28 composite columns tested by previous researchers. The comparisons show that the proposed new approach gives satisfactory predictions of the strengths of the composite columns. Key Words: concrete-encased composite column, relative rigidity, strength superposition, column test results, fiber analysis, ACI-318 code, AISC-LRFD specification.

Author

Composite Materials; Axial Loads; Concretes; Rigid Structures

20080009669 National Chung Hsing Univ., Taichung, Taiwan, Province of China

An Optimization Model of Sewage Rehabilitation

Yang, Ming-Der; Su, Tung-Ching; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 651-659; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

Due to low visibility, sewer systems are difficult to monitor, maintain and rehabilitate. To prevent failures, environmental pollution, and wastewater treatment overflow, regular rehabilitation of sewage is necessary. However, sewage rehabilitation

usually costs an immense amount of money and is hampered by a limited budget. Thus, efficient planning of maintenance and rehabilitation for sewage upkeep is demanded. In this paper, an optimization model has been built to find an appropriate rehabilitation strategy consisting of a rehabilitation method and a substitute material for each pipe failure under a limited budget. The optimization model was designed to search for a Pareto curve (or trade-off front) consisting of a set of optimal solutions with desirable rehabilitation effectiveness at the least cost. This paper employs genetic algorithms (GA) to obtain a Pareto curve at a low computation cost for large and complex sewer systems. This optimization model was applied to a sewer system in the 15th district of Kaohsiung City, Taiwan. Compared with the experts' manual estimation, the optimization model saved about 20% of the rehabilitation cost for Kaohsiung City. Key Words: sewage rehabilitation, optimization, genetic algorithm, Pareto curve

Author

Sewage; Optimization; Complex Systems; Waste Water; Maintenance; Environment Pollution; Failure

20080009670 National Taiwan Ocean Univ., Keelung, Taiwan, Province of China

A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique

Cheng, Shyi-Chyi; Kuo, Chen-Tsung; Lai, Wei-Ming; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 675-687; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 92-2213-E-327-001; Copyright; Avail.: Other Sources

This paper presents a new segmentation algorithm for 3D models based on a series of patch growing and merging processes using a shortest-path labeling technique. This algorithm starts with the patch growing process, which groups triangles into homogeneous surfaces by shortest-path labeling. Each resulting small patch is then merged to the patch that is the nearest to it in terms of geometric similarity and spatial proximity. Finally, 3D models are separated into sets of polygonal patches, each of them consisting of a set of similar triangles in terms of normal differences. One problem with patch growing is its inherent dependency on the selection of starting triangles, which can be fine tuned iteratively. Experimental results demonstrate the good performance of the new method in terms of better segmentation and less sensitivity to noise, as well as in terms of computational efficiency.

Author

Three Dimensional Models; Segments; Analogies; Simplification; Triangles; Algorithms

20080009673 Tatung Univ., Taipei, Taiwan, Province of China

Low Complexity Convolutional Codes of Rate $2/N$

Hsu, Chau Yun; Kuo, Tsung Sheng; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 731-736; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

In this paper, we show that the inherent branch symmetry in the trellis can be used to reduce the computational complexity of the Viterbi decoder. Under the branch symmetry consideration, we propose a modified search algorithm to search new convolutional codes of rate $2/n$, with not only high error-correcting capability but also high branch symmetry. By exploiting the branch symmetry, the branch metric computation of the new codes can be reduced by a factor of 4 or 8 with a performance similar to previous best codes.

Author

Algorithms; Complexity; Telecommunication; Error Correcting Codes; Convolution Integrals

20080009674 Osaka Univ., Osaka, Japan

Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images

Cheng, Yuanzhi; Sato, Yoshinobu; Wang, Shuguo; Fu, Yili; Liao, Chunghsin; Tamura, Shinichi; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 661-673; In English; See also [20080009667](#)

Contract(s)/Grant(s): JSPS-11680389; Copyright; Avail.: Other Sources

In the human body, two particular cartilages are in proximity to each other. To estimate the influence of one articular cartilage on the accuracy of thickness measurement of another articular cartilage from MR images, we formulated a mathematical model of two adjacent sheets composed of Sheet(sub 1), and Sheet(sub 2) with a narrow interval τ (sub 0) between them, and then performed numerical simulations of MR imaging and postprocessing. In this paper, we mainly focused on assessing the influence of Sheet(sub 1), on the accuracy of thickness measurement of Sheet(sub 2). We defined thickness as the distance between the two edges of the sheet structure, which are the zero-crossings of the second directional derivatives combined with Gaussian blurring along the normal direction of the sheet surface. A single sheet structure was also modeled

and simulated. The simulated results confirmed that when $\tau(\text{sub } 0)$ less than $3 - 4 \sigma$ (Gaussian standard deviation) mm, the adjacent sheet (Sheet(sub 1)) affected measured thickness of Sheet(sub 2); thickness of Sheet(sub 2) was underestimated by comparison with a single sheet. The four phantoms and clinical MR data of 5 normal volunteers without history of hip pain were used to validate the theoretical simulation.

Author

Accuracy; Imaging Techniques; Mathematical Models; Magnetic Resonance

20080009675 National Chengchi Univ., Taipei, Taiwan, Province of China

Design and Implementation of a Flexible Function Access Control Tool for Web Applications

Chen, Kung; Chang, Chih-Shang; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 737-743; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

This paper presents a flexible and practical tool, F-menugen, which supports function access control on the presentation tier by restricting user menus to functions that a user's access privileges permit. The menu structure and rules governing the functions accessible to a user are specified declaratively in an XML configuration file; the rules are based on user profiles, application-specific requirements, and certain contextual information. After user login, the tool will generate a tailored function menu according to the user's access privileges. Future changes of access control rules can also be effectively realized by modifying the configuration file without actual coding.

Author

Access Control; Web Services; Mathematical Models; Computer Systems Design; Document Markup Languages

20080009676 National Central Univ., Chung-Li, Taiwan, Province of China

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material

Lei, Hin-Chi; Chen, Sheng-Wei; Hong, John M.; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 557-567; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 94-2211-E-008-019; Copyright; Avail.: Other Sources

The nonlinear partial differential equation governing the spherically symmetric dynamic deformations of Blatz-Ko materials is studied. The Lie groups and three invariant solutions of the governing equation are derived. Two of the invariant solutions are in separable form. The governing equation of the invariant solution in nonseparable form is a singular second order non-autonomous ordinary differential equation (ODE). We transform this ODE to an autonomous ODE successfully and analyze its trajectories in the phase plane. By doing this we can capture the global behaviors of the solutions for the ODE. Especially, we can figure out what kind of problems will have singularity. The invariant solution in non-separable form studied in this paper is interesting because it shows that when localization or blowing up of some physical quantities occurs close to the outer boundary of a Blatz-Ko sphere the sphere may still look normal, that is, the distribution of the radial deformation as well as the boundary data still vary moderately. Therefore this special invariant solution gives us new insights about the behaviors of Blatz-Ko materials. Key Word: Blatz-Ko material, invisible singularity, dynamic singularity, nonlinear elasticity.

Author

Equations of Motion; Differential Equations; Nonlinear Equations; Trajectories; Spheres; Lie Groups

20080009677 National Cheng Kung Univ., Tainan, Taiwan, Province of China

Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment

Chiang, Kai-Wei; Huang, Yun-Wen; Niu, Xiaoji; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 759-763; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 95-2221-E-006-001; Copyright; Avail.: Other Sources

Inertial navigation systems (INS) have been widely applied in many applications, such as precise positioning, navigation and guidance. Generally speaking, the initial attitude angles between the body and navigation frames are estimated during the INS alignment process using an optimal estimator such as the Kalman filter. Due to measurement errors, the Kalman filter takes about up to fifteen minutes to converge. In this article, a hybrid scheme integrating an Adaptive Neuro-Fuzzy Inference System with the Kalman filter is proposed to achieve a faster and more accurate alignment process. The preliminary results indicate that a faster alignment with superior accuracy can be achieved through the use of the proposed scheme. Key Words: INS, alignment, Kalman filter, ANFIS

Author

Inertial Navigation; Alignment; Kalman Filters; Fuzzy Systems; Attitude (Inclination); Positioning; Neural Nets

20080009678 National Sun Yat-Sen Univ., Kaohsiung, China

A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK

Sheu, Tsang-Ling; Wu, Lien-Wen; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 745-751; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

A throughput degradation model under multiple consecutive packet losses for TCP-SACK is presented in this paper. We consider a more realistic case where multiple consecutive packet losses in an RTT round are possible. Based on the occurrence of consecutive packet losses, the throughput degradation model consists of three cases: no loss indication, single loss indication, and multiple loss indications. The analytical results derived from the model are validated through OPNET simulation.

Author

Packet Transmission; Mathematical Models; Degradation; Protocol (Computers); Internets

20080009679 Stanford Univ., CA, USA

Indexpro: An Efficient Protein Indexing System Based on Knot Theory

Chu, Cheng-Tao; Chang, Ya-Hui; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 703-715; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

The proteins, with complex three dimensional structures, are traditionally time consuming to observe and work with. In this paper, we apply knot theory to represent proteins as an easily extensible numerical model, an R30. The model can not only be indexed efficiently with some commonly used spatial access methods in databases, e.g., the R* tree and the M tree, but can also be extended by any feature which can be quantified. We construct the system indexpro and design several experiments to evaluate its performance. As the experimental results show, our system can correctly classify proteins at a satisfactory success rate. Moreover, with the help of the indexes, our system can operate tens of thousands of times faster than existing systems, and scale quite well as the number of proteins grow. Key Words: bioinformatics, protein, structure similarity, indexing

Author

Proteins; Data Bases; Systems Analysis; Mathematical Models; Indexes (Documentation)

20080009680 National Chiao Tung Univ., Taipei, Taiwan, Province of China

Universal Share for the Sharing of Multiple Images

Fang, Wen-Pinn; Lin, Ja-Chen; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 753-757; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 95-2221-E-009-256; Copyright; Avail.: Other Sources

To share numerous grey-valued images (or numerous color-valued images), this study presents a system with a universal share. A company organizer can use this universal share to attend the recovery meeting of any shared image. No storage space is wasted; i.e. for each shared image, the total storage space occupied by all generated shares (including the universal share) is identical to the image size.

Author

Color; Imaging Techniques; Extraction; IFF Systems (Identification); Cryptography

20080009681 National Chiayi Univ., Chiayi, Taiwan, Province of China

Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003

Lin, Yu-Yuan; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 605-620; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

The new provision for seismic design of fixed-base and seismically isolated buildings in Taiwan was put into practice on July 1, 2005. The purpose of this paper is to compare the design forces for seismic design of buildings equipped with and without (fixed-base buildings) isolation systems in Taiwan. It is shown from the study that for site classes II, III and the Taipei Basin, the design force for isolated buildings is obviously larger than that for fixed-base buildings. To lower the design force of isolated buildings, It is suggested that the inelastic-deformation capability of the structure above the isolation system be slightly considered.

Author

Buildings; Deformation; Lateral Stability; Design Analysis

20080009682 National Cheng Kung Univ., Tainan, Taiwan, Province of China

Equipment and Testing Procedures for Small Strain Triaxial Tests

Kung, Gordon T.; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 579-591; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 90-2211-E-011-065; Copyright; Avail.: Other Sources

Errors of measuring the stress-strain behavior of soils using the conventional triaxial apparatus may be induced by manmade errors during preparation of a sample, low precision of instruments, inaccurate measurement methods, and improper arrangement of the conventional triaxial apparatus. In this study, such errors are investigated and two solutions are proposed: 1) develop a set of high-resolution triaxial apparatus installed with Hall effect local strain transducer and bender elements; 2) establish the recommended testing procedure (RTP) for preparing the set up of a sample. Then, a series of $K(\text{sub } 0)$ -consolidated undrained axial compression ($CK(\text{sub } 0)UAC$) tests were carried out on undisturbed Taipei silty clay using the developed triaxial apparatus and the RTP. Results showed that the Taipei silty clay displays high initial stiffness and nonlinear stress-strain behavior at small strain levels greater than $10(\text{exp } -5)$. The initial stiffness of the Taipei silty clay measured in this study is significantly higher than that measured from conventional triaxial tests but is close to that obtained from in-situ seismic tests. The capability of the developed triaxial apparatus with the RTP in measuring the small strain stress-strain behavior of soils is validated.

Author

Stress-Strain Relationships; Compression Tests; Soils; Stiffness; Errors; Hall Effect; Precision

20080009683 National Cheng Kung Univ., Tainan, Taiwan, Province of China

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis

Pan, Nang-Fei; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 593-603; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 94-2211-E151-012; Copyright; Avail.: Other Sources

A good bridge management system requires an accurate and efficient bridge performance and prediction model. Ordinary regression models have been extensively used to forecast future infrastructure conditions. However, data on current bridge conditions obtained from inspectors are inherently subjective and non-crisp; thus ordinary regression techniques are incapable of predicting future bridge performance when inspection data are not numerical. This paper presents a multiple fuzzy linear regression model for the estimation of bridge deterioration conditions. The proposed model can effectively tackle non-crisp data and a mixture of fuzzy data and crisp data. An empirical case study using bridge inspection data from Taiwan is used to examine the variables contributing to deterioration of concrete decks. The results demonstrate the capability and effectiveness of the proposed model, which can assist bridge managers to better predict bridge deck performance.

Author

Concretes; Bridges; Regression Analysis; Performance Prediction; Forecasting; Mathematical Models; Deterioration; Management Systems

20080009684 Tamkang Univ., Taipei, Taiwan, Province of China

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments

Yau, Jong-Dar; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 569-578; In English; See also [20080009667](#)

Contract(s)/Grant(s): NSC 95-2211-E-032-053; Copyright; Avail.: Other Sources

This paper intends to offer an alternative approach for deriving the buckling differential equations and boundary conditions of a straight I-column subjected to various loads. Regarding a uniformly thin-walled I-column as an assembly of three flat plates (two flanges and one web) and modeling each of the plates as a Bernoulli-Euler beam with narrow rectangular section, one can represent the nonlinear virtual work equation of the I-column in terms of Yang and Kuo's nonlinear beam theory. Based on the geometrical hypothesis of rigid section, the buckling differential equations and boundary conditions of an I-column subjected to various loads can be derived from the total potential equation presented herein by variational principle. Moreover, since the instability effect due to bi-moments has been included in the flexural buckling equations, the buckling load of cantilever I-columns subjected to compression and bi-moment should be reduced for columns with lower torsional rigidities and fewer ratios of principal flexural rigidities.

Author

Elastic Buckling; Rigid Structures; Compressing; Boundary Conditions; Nonlinear Equations; Thin Walls; Differential Equations

20080009880 Pacific Science and Engineering Group, Inc., San Diego, CA USA

Overview of the DARPA Augmented Cognition Technical Integration Experiment

St John, Mark; Kobus, David A; Morrison, Jeffrey G; Schmorrow, Dylan D; Jul 2005; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475406; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475406>

The DARPA Augmented Cognition program is developing technologies to make information systems sensitive to the capabilities and limitations of the human component of the human-machine system. By taking better advantage of individual human capabilities, and being sensitive to human limitations, it is expected that overall system performance can be improved. There have been many recent advances in understanding human decision-making, and the Augmented Cognition program is taking advantage of them. The technologies developed in measuring brain activity and various facets of cognition are serving as the basis for managing the way information is presented to the human operators of complex systems. The Augmented Cognition program is building demonstrable, quantifiable augmentations to human cognitive ability in realistic operational environments. The first phase of the Augmented Cognition program was to empirically assess the utility and validity of various psychophysiological measures in dynamically identifying changes in human cognitive activity as decision-makers engaged in cognitive tasks. This report describes the results of a Technical Integration Experiment (TIE) involving the evaluation of 20 psychophysiological derived measures (cognitive state gauges). The TIE brought these disparate approaches together to be assessed with a common test protocol. This task was developed specifically to meet the needs of assessing these very different gauges with necessary empirical controls, yet still maintain the essential character of those tasks from a cognitive perspective. Eleven of the gauges successfully identified changes in cognitive activity during the task. This report also describes the integration of individual gauge technologies into suites of gauges to simultaneously measure multiple cognitive indices, and the issues created with sensor technology integration in developing next-generation cognitive state gauges. This report summarizes the results from the TIE.

DTIC

Cognition; Decision Making

20080009939 SubChem Systems, Inc., Jamestown, RI USA

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs

Hanson, Alfred K; Donaghay, Percy L; Moore, Casey; Arrieta, Richard; Jan 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-1-0647; N00014-05-1-0648

Report No.(s): AD-A475450; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long term goal is to transition existing prototype autonomous profiling nutrient analyzers into commercial products that can be readily deployed on autonomous profiling moorings, coastal gliders and propeller driven unmanned underwater vehicles and used for sustained, autonomous ocean observations of chemical distributions and variability. A series of issues have been identified that need to be addressed to convert prototype nutrient analyzers into commercial units that can be widely used by the community for sustained and accurate, stable, autonomous operation in the ocean. These issues are; (1) a more compact size, (2) reduced reagent and power consumption, (3) enhanced biofouling suppression, (4) ease of use by non-chemists, and (5) documented performance when deployed on different platforms. Our plan to address those issues involves using recent advances in micro-fluidics and optical detectors (new SubChem and WET Labs technologies) to reduce sample flow rates and volumes and thus reagent and power consumption; (2) extend the length of field deployments by periodically isolating sensitive components so that back-flushing and chemical techniques can be used to suppress biofouling, (3) increase the ease of use by simplifying operation, pre-packaging reagents and outputting the data in engineering units, and (4) thoroughly documenting the performance by conducting demonstration experiments at field sites that have strong vertical and horizontal nutrient gradients and episodic phytoplankton blooms.

DTIC

Autonomy; Chemical Analysis; Gliders; Marine Chemistry; Mooring; Nutritional Requirements; Optical Measuring Instruments

20080010714 Naval Research Lab., Washington, DC USA

NRL Review, 2004

May 2004; 259 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475361; NRL/PU/3430--04-471; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475361>

The mission of the Naval Research Laboratory is to conduct a broadly based multidisciplinary program of scientific and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems, and ocean, atmospheric, and space sciences and related technologies. Areas covered in this review include acoustics; atmospheric science and technology; chemical/biochemical research; electronics and electromagnetics; information technology and communications; material science and technology; ocean and atmospheric science and technology; optical sciences; remote sensing; simulation, computing, and modelling; and space research and satellite technology.

DTIC

Research and Development; Nanotechnology; Technology Utilization

20080010749 Chinese Inst. of Engineers, Taipei, Taiwan, Province of China

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A

Chen, Shi-Shuenn, Editor; Tsai, Hsien-Lung, Editor; Cern, Ming-Jyh, Editor; Lee, Liang-Sun, Editor; Young, Der-Liang, Editor; Lu, Chan-Nan, Editor; Lee, San-Liang, Editor; Shieh, Ce-Kuen, Editor; Chao, Ching-Kong, Editor; September 2007; ISSN 0253-3839; 180 pp.; In English; See also 20080010750 - 20080010767; Original contains black and white illustrations; Copyright; Avail.: Other Sources

Topics covered include: Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases Time Delay H(infinity) Control of Structures under Earthquake Loading Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element; Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts; The Transition Matrix for the Scattering of Elastic Waves in a Half-Space; Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System; Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section; A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems; Modeling, Analyzing and Designing a Phase-Locked Battery Charger; Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms; An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement; Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers; Model Prediction of Indoor Particle Concentrations in a Public School Classroom; Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development; Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan; Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping; Embedded Control System Design and Practice: An Example by a FCU Controller; and Throughput Performance of DMT-Based VDSL System at High Sampling Rates.

Derived from text

Catalysts; Electric Potential; Evapotranspiration; Membrane Structures; Nanoparticles; Parameter Identification; Structural Analysis; Uncertain Systems; Wave Scattering; Control Systems Design

20080010750 Tung Nan Univ., Taipei, Taiwan, Province of China

A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems

Wang, Yuan-Jay; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1023-1036; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

A graphical technique is proposed to synthesize robust controllers to suppress the amplitude of the limit cycle persisting in uncertain nonlinear control systems using the stability equation method. First, the describing function analysis method is employed to approximate the behavior of the nonlinearity and the celebrated Kharitonov theorem is utilized to characterize the plant variations. Accordingly, a family of Kharitonov polynomials is obtained for limit cycle analysis. Further, decomposing each of the vertex Kharitonov polynomials into real part and imaginary parts results in two related stability equations. By solving the two stability equations, families of constant limit cycle amplitude loci are plotted. These loci isolate the parameter plane into several limit cycle regions. Therefore, an admissible specification-oriented parameter region is found directly on the controller coefficient plane. Furthermore, the overlapped region of the admissible parameter region for each Kharitonov polynomial is called the Kharitonov region. The Kharitonov region constitutes all of the feasible controller

parameter sets to achieve robust limit cycle amplitude suppression for the entire uncertain nonlinear control system. Hence, the controller can be designed more flexibly. Additionally, a way to tune the robust controller gains is suggested. Finally, the distinguished advantages of the proposed algorithm as compared with other proposed methods are demonstrated by two examples proposed in the literature for comparison. Key Words: limit cycle, stability equation, describing function, Kharitonov theorem.

Author

Uncertain Systems; Nonlinear Systems; Controllers; Functional Analysis; Polynomials; Functions (Mathematics)

20080010751 Ching Yun Univ., Chung-Li, Taiwan, Province of China

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers

Liu, Ji-Chyun; Liu, Chin-Yen; Kuei, Ching-Pin; Chang, Fwu-An; Lou, Der-Chyuan; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1071-1075; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

This study investigates the construction and measurement of broadband microwave absorbers constructed of -shaped/comb-shaped interdigital frequency selective surface (FSS) screens and concrete ingots to enhance frequency response. By applying the comparison decrement method, reflectivity (R) is determined from the return loss of the absorber and the conducting surface, such that R can recognize the characteristics of microwave absorbers. Experimental results indicate that 69.8% of the bandwidth's frequency responses are below -10dB when using copper concrete ingots. and 66.1 % are below -10dB when using fiber concrete ingots in perpendicular polarization (A(sub 1)) to the n-shaped FSS absorber. Using the same measurements, 71.6%. and 66.1 % of the bandwidth percentage are below -10dB with copper and fiber concrete ingots, respectively, for comb-shaped FSS absorbers in the C-band applications.

Author

Broadband; Microwaves; Frequency Response; Ingots; Bandwidth; Concretes

20080010752 Yung-Ta Inst. of Tech. and Commerce, Pingtung, Taiwan, Province of China

Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts

Hung, Chang-Mao; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 977-981; In English; See also [20080010749](#)

Contract(s)/Grant(s): NSC-95-2221-E-1320-001; Copyright; Avail.: Other Sources

Ammonia (NH₃) plays a significant role in the chemical industry, and is widely used in industrial wastewater. In this study of bimetallic platinum-rhodium nanoparticle catalysts, aqueous solutions containing 400-1,000 mg/L of ammonia were oxidized in a trickle-bed reactor (TBR). Experimental results demonstrate that little ammonia was removed by wet oxidation in the absence of any catalyst, whereas around 99%. of the ammonia was eliminated during wet oxidation over the bimetallic platinum-rhodium nanoparticle catalyst at 503 K and an oxygen partial pressure of 2.0 MPa. There is a synergistic effect of the platinum-rhodium bimetallic structure, which is the material with the highest ammonia reduction activity. Additionally, the effect of the initial concentration and reaction temperature on the removal of ammonia from the effluent streams was explored at a liquid hourly space velocity of under 9.0 /h in wet catalytic processes.

Author

Ammonia; Aqueous Solutions; Nanoparticles; Streams; Effluents; Bimetals

20080010753 National Chung Hsing Univ., Taichung, Taiwan, Province of China

Time Delay H(infinity) Control of Structures under Earthquake Loading

Lin, Chi-Chang; Wei, Jyh-Yang; Chang, Chang-Ching; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 951-960; In English; See also [20080010749](#)

Contract(s)/Grant(s): NSC92-2211-E-005-032; Copyright; Avail.: Other Sources

In this paper, an H(infinity) control algorithm is developed to reduce the earthquake response of structures with consideration of control force execution time delay. To achieve optimal control performance and assure control system stability, the strategy to select two control parameters gamma and alpha is extensively investigated. It was found that the decrease of gamma or increase of alpha results in significant reduction of structural responses. To obtain the same control results, a larger alpha has to be selected for stiff structures than for flexible structures. In addition, in active control of a real structure, control force execution time delay cannot be avoided. Relatively small delay times not only can render the control ineffective, but also may cause system instability. In this paper, explicit formulas for the maximum allowable delay time and

critical control parameters are derived for the design of a stable H(infinity) control system. Some solutions are also proposed to lengthen the maximum allowable delay time.

Author

Active Control; Earthquakes; Time Lag; H-Infinity Control; Control Systems Design; Structural Engineering

20080010754 National Taiwan Univ. of Science and Technology, Taipei, Taiwan, Province of China

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases

Ku, Young; Huang, Tai-Chi; Ma, Chih-Ming; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 943-950; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

The effect of several operating factors on the decomposition of 2-chlorophenol in aqueous solution by sonolysis was investigated in this study. Experiments conducted with the purge of Ar/O₂ gas mixture of 2:1 molar ratio into aqueous solution yielded noticeably higher decomposition rate for 2-chlorophenol ($k(\text{sub I}) = 0.0060$) possibly due to the increased solubility of the gas mixture. Sonochemical decomposition of 2-chlorophenol was found to be more effective for experiments conducted in acidic and neutral solutions than in alkaline solutions (about 85% decomposition at solution pH 3). The sonication rate constant for the decomposition of 2-chlorophenol was increased (0.0006 to 0.00516 at pH = 3; 0.00023 to 0.00284 at pH = 9) with sonication intensity applied between 8 and 50W cm⁻². The addition of appropriate amounts of ferrous ions could increase the decomposition rate of 2-chlorophenol by sonolysis, suggesting that Fe²⁺ ions may react with hydroxyl peroxide to prevent the recombination of hydroxyl free radicals.

Author

Reaction Kinetics; Aqueous Solutions; Dissolved Gases; Decomposition; Hydroxyl Radicals; Gas Mixtures

20080010755 National Taiwan Univ. of Science and Technology, Taipei, Taiwan, Province of China

Embedded Control System Design and Practice: An Example by a FCU Controller

Chung, Sheng-Luen; Chu, Cheng-Wei; Fu, Yu; Chen, Jiann-Jone; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1103-1107; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

An embedded control system (ECS) is a delicate system that provides specific control function to a larger system where the ECS is embedded. With the variety of control objectives, design of embedded control systems can be very different, and generally result in ad hoc designs. This paper proposes a systematic approach for embedded control systems; in particular, this paper addresses the three most important issues: (1) functional specification and modeling by Statecharts, (2) modular design and implementation of software and hardware for: sensor, control algorithm, actuator and user interface, and (3) verification of the final implementation. This paper presents a systematic approach to embedded control systems in four step\by gathering associated methods reported in the literature which are otherwise scattered For illustration, this paper takes an intelligent temperature controller of heating ventilation and air conditioning (HVAC) system to highlight the three design stages of product development for embedded control systems.

Author

Control Systems Design; Embedding; Controllers; Systems Engineering; Electric Coils; Ventilation Fans

20080010756 National Defense Univ., Taipei, Taiwan, Province of China

Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms

Yu, Chi-Shan; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1047-1057; In English; See also [20080010749](#)

Contract(s)/Grant(s): NSC 95-2221-E-014-040; Copyright; Avail.: Other Sources

Distance relays are widely used for transmission line protection. The dependability of distance relays can be improved by obtaining the accurate apparent impedance as fast as possible. In conventional design, the fault voltage and current are filtered separately to remove the decaying dc components and obtain accurate fundamental phasors, respectively. However, the main task of distance protection is not to obtain the accurate voltage or current fundamental phasor, but to obtain the accurate apparent impedance. This paper proposes a new technique to simultaneously consider voltage and current waveforms and remove the decaying dc component between them. By the proposed technique, although the decaying dc components in voltage and current are not removed, the decaying dc effect in apparent impedance is removed. In comparison with the existing

algorithms, the proposed technique is simpler and easier to implement. The simulation results demonstrate the effectiveness and accuracy of the proposed technique.

Author

Electric Potential; Waveforms; Direct Current; Electrical Impedance; Electric Relays

20080010757 National Taiwan Univ., Taipei, Taiwan, Province of China

Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development

Wu, I-Chen; Hsieh, Shang-Hsien; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1085-1090; In English; See also [20080010749](#)

Contract(s)/Grant(s): NSC 94-2211-E002-065; Copyright; Avail.: Other Sources

To facilitate the incorporation of 3D CAD objects into the 3D-CIS environment, this paper proposes a feasible approach to transform the 3D geometric information of CAD objects expressed by the IFC model into geometric objects for the GML model. The discussions include not only the proposed model transformation methodology but also the development of a software tool that implements the proposed methodology. In addition, a simple model transformation example is provided to demonstrate the feasibility of the proposed methodology and the functionalities of the developed tool.

Author

Computer Aided Design; Interoperability; Computer Programming; Transformations (Mathematics)

20080010758 National Chiao Tung Univ., Hsinchu, Taiwan, Province of China

An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement

Wang, Shih-Hao; Chen, Wei-Lin; Chiang, Tihao; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1059-1070; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

The need for interoperability poses a challenge with the widespread use of multiple video formats. A Multi Layer Streaming-Simplified DCT Domain Transcoder (MLS-SDDT) is proposed to achieve efficient transcoding and video quality improvement. However, an efficient architecture is needed to handle drifting errors. The MLS-SDDT algorithm addresses these issues by proposing: (1) an FGS compatible Simplified DCT Domain Transcoder (FGS-SDDT) architecture for MPEG-1/2/4 single layer transcoding, and (2) an R-D optimized multi-layer streaming technique for video quality improvement. To support efficient transcoding from FGS to MPEG-1/2/4, the FGS-SDDT adopts low complexity Simplified DCT Domain Transcoder (SDDT) architecture as an FGS compatible SDDT. To resolve the serious error-drifting problem from SDDT, especially for heterogeneous transcoding, a mathematical analysis of the error-drifting problem is provided and a solution by multi-layer streaming is adopted. The multi-layer streaming approach pre-computes the errors according to the mathematical analysis and encodes the errors as the second enhancement layer for error compensation. For different network conditions, an R-D optimized model is used to improve the bit allocation in the two enhancement layers for better R-D performance. Our experiments show that the MLS-SDDT can deliver 1.4-7.0 dB PSNR improvement for MPEG-1 and 1.9~8.6 dB improvement for MPEG-2 as compared to the SDDT. For FGS to MPEG-4 single layer transcoding, the MLS-SDDT can achieve minor PSNR loss (0.0 ~ 0.4 dB) with lower computational complexity as compared to the SDDT approach.

Author

Optimization; Video Communication; Algorithms; Quality Control; Interoperability

20080010759 University of Electronics Science and Technology of China, Chengdu, China

Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping

Yin, Jihao; Liu, Benyong; Wang, Ling; Chen, Tianqi; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1097-1101; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

A novel method is presented for parameter estimation of multi-component phase-coded signals (PCSs). The algorithm is based on the short time Fourier transform (STFT), in which the high concentration of signals in the time-frequency (TF) domain is used to separate each component, then the STFT zooming and phase jump mapping are proposed to estimate the carrier frequency (CF), symbol period and code sequence of each component. Feasibility of the presented method is demonstrated by experimental results.

Author

Parameter Identification; Mathematical Models; Fourier Transformation; Signal Transmission; Coding

20080010760 Feng Chia Univ., Taichung, Taiwan, Province of China

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System

Fen, Chiu-Shia; Chang, Chunkuei; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 997-1007; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

A multiphase flow and transport model is modified and applied to study the influence of spatial variability of soil properties on predictions of contaminant mass removal for a soil vapor extraction system (SVES). Spatial distributions of mean particle size ($d_{(sub\ m)}$), soil porosity (ϕ), permeability (k) and interphase mass transfer rate between air and organic liquid phases ($K_{(sub\ go)}$) for nonuniform soil composed of fine- to coarse-grain sands are considered in the model. For these parameters, ϕ and $d_{(sub\ m)}$ are generated based on a geostatistical model and k and $K_{(sub\ go)}$ are determined according to theoretical or empirical correlations expressed in terms of $d_{(sub\ m)}$ and/or ϕ . Results show that uncertainty in spatial distribution of any of these parameters can exert a significant influence on the predicted removal percentage, even for cases with low variability in $d_{(sub\ m)}$. In particular, to rigorously predict SVES contaminant removal efficiency, one must assess in-situ $K_{(sub\ go)}$ value or the relationships of $K_{(sub\ go)}$ to other factors. The present simulations show that uncertainty in spatial variation of these parameters can result in a wide variety of organic liquid saturation distributions during SVES operation, even if the predicted removal percentages are similar for different cases. For longterm soil remediation by SVE, in order to promote SVES mass removal efficiency, intermediate stages of the operation must include reassessment of in-situ contaminant mass distribution. This new information can be used to relocate extraction wells, if necessary, to promote SVES mass removal efficiency. Key Words: soil vapor extraction system, nonequilibrium interphase mass transfer, geostatistical model, a multiphase flow and transport model.

Author

Soil Science; Vapors; Liquid Phases; Multiphase Flow; Contaminants; Extraction; Mass Transfer; Soils

20080010761 Chiang Mai Univ., Thailand

Model Prediction of Indoor Particle Concentrations in a Public School Classroom

Tippayawong, Nakorn; Khuntong, Patcharavadee; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1077-1083; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

Indoor particle concentration and its relationship with outdoor particle level were investigated using a macroscopic indoor air quality model for a classroom ventilated naturally. The model was validated with measurement data obtained from an optical particle analyzer's measurements. Reasonably good agreement between the predicted results and measurements was demonstrated. The regression curves between modeling and measurement have slopes of 0.78 - 1.29 and correlation coefficients ($R^{(sup\ 2)}$) of 0.78 - 0.91, for the size range between 0.3 to 5.0 μm . The effect of air exchange rate on indoor/outdoor concentration ratios was also studied. The model simulations suggested that indoor and outdoor air exchange had direct influence on indoor PM concentration. For high outdoor concentrations, low air exchange rates could reduce the concentration levels of particles indoors. The results were found to compare well with those reported in the literature.

Author

Indoor Air Pollution; Ventilation; Particulates; Size Distribution; Air Quality; Air Flow; Environment Models

20080010762 National Kaohsiung Normal Univ., Kaohsiung, Taiwan, Province of China

Throughput Performance of DMT-Based VDSL System at High Sampling Rates

Lin, Sun-Ting; Wei, Che-Ho; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1109-1113; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

Very high-speed digital subscriber line (VDSL) is a cost effective solution for the last mile of the network over the existing twisted-pair telephone lines. The target of the VDSL system is to raise the transmission data rate up to 52 Mbps for short distances (300 m or less). This paper investigates the throughput of a DMT-based VDSL system at high sampling rates under the influence of various noises/interferences. The throughput limitation of the VDSL system is discussed and the optimal solutions of the sampling rates under various test loop lengths and environmental conditions are also investigated.

Author

Digital Systems; High Speed; Modulation; Electromagnetic Interference; Pulse Communication

20080010763 National Changhua Univ. of Education, Changhua, Taiwan, Province of China

Modeling, Analyzing and Designing a Phase-Locked Battery Charger

Chen, Liang-Rui; Wang, Chau-Shing; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of

the Chinese Institute of Engineers, Series A; September 2007, pp. 1037-1046; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

In this paper, a linear model for describing the Li-ion battery charging response is developed. Then a Phase-Locked Battery Charger (PLBC) mathematical model is built, and its s-domain transfer function is also derived. The stable, safe and fast charging conditions of the PLBC are discussed and many criteria are proposed. After that, a complete design procedure is presented for designing a fast and safe PLBC. Finally, a test example of the PLBC is designed and implemented for a 700 mAh Li-ion battery in order to assess the performance of the presented Li-ion battery model, PLBC mathematical model and design criteria. Experiments show that the computer simulation is close to the actual measurement. This means that the presented models of the Li-ion battery and the PLBC are correct and can capture major electrical characteristics. Experiments also show that a stable, fast and non-overcharging PLBC is successfully implemented as we wanted. This indicates that the presented PLBC design procedure is valid and can really help engineers design a fast and safe battery charging system.

Author

Design Analysis; Phase Locked Systems; Battery Chargers; Transfer Functions; Computerized Simulation; Electric Batteries

20080010764 National Central Univ., Chung-Li, Taiwan, Province of China

Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element

Wu, Tong-Yue; Wang, Chung-Yue; Chuang, Ching-Chiang; Ting, Edward C.; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 961-976; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

In this paper, a constant strain triangular membrane element, which is a new member of the VFIFE (vector form intrinsic finite element) family, is proposed to analyze space motion of arbitrary 3D membrane structures. A description of kinematics to dissect rigid body and deformation displacements, and a set of deformation coordinates for each time increment to describe deformation and internal nodal forces are provided. Similar to other members of the VFIFE family, a convected material frame and explicit time integration for the solution procedures are also adopted. Five numerical examples are presented to demonstrate the performance and applicability of the proposed element on the motion analysis of 3D membrane structures. It was found that the proposed element could go through the patch tests and gives stable, convergent and accurate results.

Author

Deformation; Membrane Structures; Displacement

20080010765 National Chung Hsing Univ., Taichung, Taiwan, Province of China

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section

Fang, Fuh-Min; Li, Yi-Chao; Liang, Tsung-Chi; Chen, Chu-Chang; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1009-1022; In English; See also [20080010749](#)

Contract(s)/Grant(s): NSC 92-2211-E-005-028; NSC 93-2211-E-005-008; Copyright; Avail.: Other Sources

The aerodynamic instability of a suspension bridge with a hexagonal cross-section is investigated systematically based on a two-dimensional model. Measurements of the dynamic responses of a sectional bridge model in the cross-wind and torsional directions were firstly carried out in a wind tunnel. The results were used to guide and confirm the execution of parallel numerical simulations. Accordingly, both the experimental and numerical results are used as bases to examine the flow effect as well as the aeroelastic behavior of the bridge in detail. Results show that the numerical predictions of the structural responses agree well with those from the experiments, indicating that the proposed numerical method is capable of predicting the deck motion with good accuracy. Based on the time-series numerical results, extensive investigations reveal that a hexagonal deck has much better aerodynamic stability performance than a rectangular one. Finally, among the hexagonal decks studied, it is found that one with a 30° side angle leads to the greatest critical flutter speed.

Author

Two Dimensional Models; Aerodynamic Stability; Numerical Analysis; Wind Direction; Mathematical Models; Bridges (Structures); Critical Velocity; Aeroelasticity

20080010766 National Taiwan Univ. of Science and Technology, Taipei, Taiwan, Province of China

The Transition Matrix for the Scattering of Elastic Waves in a Half-Space

Yeh, Chau-Shiung; Teng, Tsung-Jen; Liao, Wen-I.; Chai, Juin-Fu; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 983-996; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

In this paper, the transition matrix for elastic waves scattering from an alluvium on an elastic half-space is developed.

Betti's third identity is employed to establish orthogonality conditions among basis functions that are Lamb's singular wave functions. The total displacements and associated tractions for both the surrounding half-space and alluvium are expanded in a Rayleigh series. After the boundary conditions are applied, the T-matrix can be obtained. Explicit forms of the basis functions are derived for the two-dimensional anti-plane and in-plane problems. The linear transformation is utilized to construct a set of orthogonal basis functions. The transformed T-matrix is related to the scattering matrix and it is shown that the scattering matrix is symmetric and unitary and that the T-matrix is also symmetric. Some typical scattering cases induced by incident plane waves are illustrated for verification.

Author

Matrices (Mathematics); Wave Scattering; Half Spaces; Elastic Waves; Linear Transformations; Alluvium

20080010767 National Cheng Kung Univ., Tainan, Taiwan, Province of China

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan

Lin, Chih-Hsien; Chao, Cheng; Chen, Wen-Fu; Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A; September 2007, pp. 1091-1096; In English; See also [20080010749](#); Copyright; Avail.: Other Sources

This paper demonstrates the application of an adaptive network-based fuzzy inference system (ANFIS) employed by mapping meteorological data between known inputs (wind speed, relative humidity, temperature, and sunshine radiation) and output (evapotranspiration). The results, after training, show that the fuzzy inference system (FIS) is able to capture the nonlinear feature for evapotranspiration. Moreover, the trained FIS is integrated into geographical statistical technology, Kriging, for the estimation of the regional evapotranspiration, forestland and farmland in Dan-Shui Basin as an example. It is found that ANFIS simulation effectively reduces the amounts of formula parameters, computation time, and diverse procedure, which can be another efficient mathematical tool to deal with the study of evapotranspiration estimation.

Author

Evapotranspiration; Inference; Taiwan; Adaptive Control; Communication Networks; Fuzzy Systems; Neural Nets; Structural Basins; Estimating

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*.

20080009895 Institute for Defense Analyses, Alexandria, VA USA

Assessing the Adequacy of Coverage of Joint Command and Control in the Capstone Concept for Joint Operations

Freeman, Waldo D; Morton, Lawrence B; Feb 2007; 152 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DASW01-04-C-0003

Report No.(s): AD-A475446; IDA-P-4193; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475446>

The Joint Staff, J7 Joint Experimentation, Transformation, and Concepts Division asked the Institute for Defense Analyses (IDA) Joint Advanced Warfighting Program (JAWP) to evaluate how adequately the Capstone Concept for Joint Operations (CCJO) covers joint command and control (JC2). The CCJO heads the family of joint operations concepts (JOpsC) that describe how joint forces are expected to operate across the range of military operations in 2012-2025. Its purpose is to lead force development and employment primarily by providing a broad description of how the future joint force will operate. The IDA study team first evaluated the CCJO itself relative to JC2. The team then reviewed current doctrine, operations, planning, and activities with JC2 content -- the Universal Joint Task List (UJTL), Multi-Service Force Deployment (MSFD) Scenarios, wargames, and experiments -- for possible insight that might inform the next revision of the CCJO. These sources proved generally unhelpful. The study team then examined advanced theoretical work, especially the OSD Command and Control Research Program (CCRP), for insight. This proved very useful and provided a theoretical framework of possible future JC2. Next the team reviewed concepts subordinate to the CCJO that have JC2 content, particularly the C2 functional and integrating concepts. Both were consistent with the CCRP framework and were conceptually ahead of the CCJO. Finally, the team examined selected Defense Advanced Research Projects Agency C2 work and activities at JFCOM. Both reinforced the correctness of the direction reflected in the CCRP and the subordinate JC2 concepts. In answering four specific

sponsor-directed questions related to doctrinal command structures, capability gaps, treatment of C2 in the CCJO, and subordinate C2 concepts, the study team reached four conclusions indicating that greater clarity regarding future JC2 is needed in the CCJO.

DTIC

Command and Control; Military Operations

20080009987 Army Command and General Staff Coll., Fort Leavenworth, KS USA

Close Air Support Command and Control at the Operational Level

Shoemaker, David G; Dec 14, 2007; 96 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475575; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Close Air Support is inherently one of the most joint endeavors in today's military. Coordination and integration of air and ground assets are the keys to successful close air support. Command and control at the operational level can set the stage for success or failure. Advances in technology, changes in warfare, and transformation of Army organization have led to rapid change in the world of command and control. Doctrine publications at all levels struggle to keep pace with changes. With this problem in mind, the primary question is whether or not Joint, US Air Force, and US Army doctrine and TTPs work together to ensure effective CAS command and control at the operational level in the current operational environment. This study starts with a history of air-ground coordination and the command and control of close air support. It then compares current Joint, Air Force, and Army publications to find doctrinal disconnects that might lead to gaps in joint integration and suggests changes to the lifecycle and update methods of Joint and service doctrine documents.

DTIC

Command and Control; Military Operations; Support Systems

20080010787 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

An Operator Perspective on Net-Centric Underwater Warfare

Mellema, Garfield R; Jul 12, 2007; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475290; DRDC-ATLANTIC-SL-2007-128; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475290>

In March 2007, the Networked Underwater Warfare Technology Demonstration Project at Defence R&D Canada - Atlantic conducted an at-sea antisubmarine trial utilizing Net-centric Warfare (NCW) constructs to demonstrate improved technologies for underwater warfare. User feedback was solicited during and after the trial for the purpose of documenting the manner in which the systems were used during the trial and gaining insight into their potential future usage in NCW activities. This paper describes some of the key issues raised and how they might be addressed in the future. Although some of the issues raised can be addressed through adjustments in the communications strategy, the way ahead for NCW will require a redefinition of the concept of operations for each platform and for the team in order to balance the advantages of the team and platform-centric approaches.

DTIC

Warfare; Antisubmarine Warfare

20080010913 Research and Technology Organization, Neuilly-sur-Seine, France

Knowledge-Based Radar Signal and Data Processing

September 2006; In English; Lecture Series, 15-16 May 2006, Brno, Czech Republic; See also 20080010914 - 20080010921; Original contains color and black and white illustrations

Report No.(s): RTO-EN-SET-063bis; AC/323(SET-063)TP/59; Copyright; Avail.: CASI: C01, CD-ROM

The objective of this Lecture Series was to present a state-of-the-art assessment of Knowledge-Based (KB) radar signal and data processing techniques, and thereby increase awareness of their value to the NATO scientific community. The Lecture Series covered: Fundamentals of Relevant Knowledge-Based Techniques; Detailed Characterization of the General Radar Problem; Expert System Application to Constant False Alarm Rate Processor; Knowledge-Based Control for Space Time Adaptive Processing; KB Techniques Applied to Performance Improvement of Existing Radar Systems; Impact of KB Techniques for Emerging Technologies; Integrated End-to-End Radar Signal & Data Processing with Over-Arching KB Control. The Lecture Series reviewed the current developments in the area and present examples of improved radar

performance for augmented and upgraded systems. In addition, the series projected the impact of KB technology on future systems.

Author

Knowledge Based Systems; Data Processing; Radar Detection; Signal Processing; Technology Assessment

20080010914 SELEX Sistemi Integrati S.p.A, Rome, Italy

Introduction to Radar Signal and Data Processing: The Opportunity

Farina, A.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 1-1 - 1-24; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 1; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper introduces to the lecture series dedicated to the knowledge-based radar signal and data processing. Knowledge-based expert system (KBS) is in the realm of artificial intelligence. KBS consists of a knowledge base containing information specific to a problem domain and an inference engine that employs reasoning to yield decisions. KBS have been built: some are very complex with thousands rules while others, relatively simple, are designed to tackle very specialised tasks. This lecture series shows that KBS can be successfully applied to radar systems. This paper introduces the Reader to the world of radar and, specifically, to the topics tackled in the subsequent lectures of the series. The paper starts with an introduction (Section 2) to radar (radar evolution from the early days up today, taxonomy of radar and radar equation). Subsequently, Section 3 considers the schematic of a modern radar system. The phased-array radar is the theme of Section 4. Signal processing, one of the main building blocks of modern radar, is introduced in Section 5. The section also introduces to the various forms of adaptivity in time, space and space-time domains for natural and intentional interference mitigation. Data processing, mainly target tracking, (Section 6) is the other relevant building block of radar. An extensive list of references (Section 9) is helpful to the Reader for a deeper insight to the many interesting topics of radar.

Author

Knowledge Based Systems; Signal Processing; Tracking (Position); Phased Arrays; Data Processing; Expert Systems; Radar Data; Artificial Intelligence

20080010915 University Coll., London, UK

Knowledge-Based Solutions as They Apply to the General Radar Problem

Griffiths, H. D.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 3-1 - 3-22; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 3; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This tutorial provides an introduction to the application of knowledge-based processing to the general radar problem. We interpret knowledge-based processing as the use of adaptivity and the exploitation of prior knowledge in such a way as to choose the optimum processing method in each case, and we interpret the general radar problem as the detection, classification and tracking of targets against a background of clutter and interference. As such the tutorial attempts to describe the nature of the general radar problem and the basic processing techniques that are used, and to show why knowledge-based signal processing may be advantageous, setting the scene for the subsequent tutorials covering CFAR detection, space-time adaptive processing, tracking, and emerging technologies. The fundamental concepts of matched filtering, superresolution and adaptive filtering are described, emphasizing the equivalence of time/frequency and aperture/angular domains, and introducing the concept of Space-Time Adaptive Processing. A description is given of some of the statistical clutter models in common use (Rayleigh, Ricean, Lognormal, Weibull and Compound-K), with practical examples of sea clutter and of land clutter which demonstrate that clutter is in general non-Gaussian and non-stationary, both in time and space. Two examples are given of the application of adaptive techniques to the suppression on nonhomogeneous clutter, showing that the performance of the adaptive Doppler filtering algorithm is severely compromised at clutter edges, due to incorrect estimation of the clutter covariance matrix, and how in Space-Time Adaptive Processing a nonhomogeneity detector can be used in the choice of the most appropriate STAP algorithm, forming the so-called Knowledge-Based STAP (KB-STAP) processor.

Author

Knowledge Based Systems; Signal Processing; Space-Time Adaptive Processing; Adaptive Filters; Clutter; Tracking (Position); Classifications; Weibull Density Functions

20080010916 University Coll., London, UK

Impact of Knowledge-Based Techniques on Emerging Technologies

Griffiths, H. D.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 7-1 - 7-28; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 7; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This tutorial provides a discussion of the application of knowledge-based processing techniques to emerging technologies. Following the third of the tutorials in this series we interpret knowledge-based processing as the use of adaptivity and the exploitation of prior knowledge in such a way as to choose the optimum processing method in each case. We interpret emerging technologies as novel applications, such as multifunction phased array radars, waveform diversity, bistatic and multistatic radars, and synthetic aperture radars. Firstly, we consider the potential of electronically-steered phased array antennas and the associated signal processing techniques. This is followed by a description of knowledge-based processing in the task scheduling in a multifunction phased array radar. It is shown that prior information on targets can be used to control parameters such as update rate and dwell time. Next, we consider waveform diversity, which may be considered to be a development of multifunction phased array radar, in which a radar may simultaneously radiate and receive different signals in different directions for different purposes. Such a scheme may entail adaptivity in the angular domain, in the time domain and in the coding domain (and conceivably in other domains as well), and the use of knowledge-based techniques in this processing has obvious attractions. Two examples are discussed: the first is target-matched illumination, which shows that there is an optimum waveform for the detection of a given target in a given environment, and the second is interpolation between two (or more) spectral bands to give the effect of a signal of very high bandwidth, and hence very high range resolution. Next there follows a discussion of the application of knowledge-based techniques to bistatic and multistatic radar, including the use of information on waveform properties in passive coherent location (PCL), tracking in multistatic radar, and spatial denial as a waveform diversity technique to prevent the exploitation by an enemy of a radar as a bistatic illuminator. Finally, an example is given of the use of context in target detection in synthetic aperture radar imagery, exploiting the fact that targets of interest will tend to be parked in groups close to hedges and the edges of woods rather than individually in the middle of open ground. Useful improvements in detection performance are obtained.

Author

Antenna Arrays; Knowledge Based Systems; Synthetic Aperture Radar; Target Acquisition; Tracking Radar; Multistatic Radar; Phased Arrays; Radar Detection

20080010917 Capraro Technologies, Inc., Utica, NY, USA

Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control

Capraro, Gerard T.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 8-1 - 8-24; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 8; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper provides information related to integrating Knowledge Based (KB) techniques within the filtering, detection, tracking and target identification portions of an airborne radar's processing chain. We will present multiple information sources and how they can be used to enhance a radar's performance for end-to-end signal and data processing.

Author

Knowledge Based Systems; Tracking (Position); Airborne Radar; Targets; Radar Data

20080010918 Air Force Research Lab., Rome, NY, USA

Knowledge-Based Control for Space Time Adaptive Processing

Wicks, Michael C.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 5-1 - 5-52; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 5; Copyright; Avail.: CASI: [A04](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The major impact of the research reported herein is the development of an adaptive algorithm that specifically addresses the rejection of discretely in the cell under test competing with all targets; and the rejection of distributed clutter competing with slow moving targets. Discretely can include large fixed clutter returns and multiple moving objects in the sidelobes. This report discusses the development of space-time adaptive processing (STAP) technology for ground moving target indication (GMTI) applications. Current GMTI systems, e.g. the E-8 Joint STARS, use nonadaptive displaced phase center antenna (DPCA) techniques. The Joint STARS platform has been very successful in certain deployments, such as the Gulf War. So the

question naturally arises, why is STAP needed for GMTI? In theory, DPCA can outperform some (suboptimal) STAP implementations. DPCA may also perform better in highly non-homogeneous environments, where sufficient training data for adaptive systems is not available. However, when hardware and system errors are considered, the performance of DPCA degrades rapidly. For example, phase, and amplitude errors between channels impose a fundamental limit on nonadaptive DPCA processing. Adaptive processing is several orders of magnitude less sensitive to receiver channel errors. STAP has demonstrated much better clutter rejection than DPCA for high velocity targets. This is because an adaptive null placed in the sidelobe region by STAP is significantly lower than the error sidelobes that limit DPCA performance. On the other hand, DPCA has traditionally provided better performance in the low velocity region, which corresponds to the main beam clutter. The objective of this research is to extend the advantages of STAP in the high velocity region to lower velocity targets. This requires some fundamental redesign of the STAP process. Merely executing the current suite of STAP algorithms in the low-velocity region is inadequate. This report summarizes past, present and proposed future STAP research. The theme of this research has been to move from AMTI STAP theory to GMTI STAP for real systems. STAP algorithms were developed under several simplifying assumptions. The adaptive weights are determined statistically, based on an estimated interference covariance matrix. This estimation requires a large number of homogeneous data samples, i.e. sample support. In the real world, the received data is non-homogeneous, and the required sample support is not available. Special techniques must be developed to counter spatially non-homogeneous interference. In addition, STAP techniques ignore array electromagnetic effects. This issue is of importance in applying STAP to real arrays. The research presented here has addressed the issues of sample support and array effects. The sample support required is directly proportional to the number of adaptive weights to be determined. This report presents two algorithms, S.. STAP and Joint Domain Localized (JDL) Processing, that yield excellent interference suppression with a limited number of unknowns. Array effects are addressed for the JDL algorithm through the use of spatial steering vectors that account for array mutual coupling. Using measured data, the examples present significant performance improvements by accounting for array effects. For nonhomogeneous scenarios, we present an alternative Direct Data Domain (D3) processing approach. D3 algorithms do not estimate a covariance matrix and provide effective suppression of discrete interference. D3 algorithms do not provide as effective suppression of spatially correlated interference as compared to covariance matrix based techniques.

Author

Algorithms; Space-Time Adaptive Processing; Knowledge Based Systems; Data Processing; Data Systems; Matrices (Mathematics); Errors

20080010919 Secretary of the Air Force, Washington, DC, USA

Expert System Constant False Alarm Rate (CFAR) Processor

Wicks, Michael C., Inventor; Baldygo, William J., Jr., Inventor; Brown, Russell D., Inventor; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 4-1 - 4-24; In English; See also [20080010913](#); Original contains black and white illustrations; US-Patent-5,499,030; US-Patent-Appl-SN-215,073

Report No.(s): Paper 4; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

radar signal processor performance by increasing target probability of detection and reducing probability of false alarm in a severe radar clutter environment. This utilizes advances in artificial intelligence and expert systems technology for the development of data analysis and information (signal) processors used in conjunction with conventional (deterministic) data analysis algorithms to combine radar measurement data (including observed target tracks and radar clutter returns from terrain, sea, atmospheric effects, etc.) with topographic data, weather information, and similar information to formulate optimum filter coefficients and threshold tests. Present fielded radar systems use one CFAR algorithm for signal processing over the entire surveillance volume. However, radar experiments have shown that certain CFAR algorithms outperform others in different environments. The system intelligently senses the clutter environment, and selects and combines the most appropriate CFAR algorithm(s) to produce detection decisions that will outperform a processor using a single algorithm. The invention provides for improved performance through the application of rule-based and data-based expert system computer software technology to CFAR signal processors, thereby improving target detection by reducing processing losses which result from a mismatch between the single, fixed CFAR processor and dynamically changing environment in which a radar must operate.

Author

Expert Systems; False Alarms; Signal Processing; Signal Analyzers; Radar Measurement; Artificial Intelligence; Surveillance

20080010920 SELEX Sistemi Integrati S.p.A, Rome, Italy

Application of Knowledge-Based Techniques to Tracking Function

Farina, A.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 6-1 - 6-34; In English; See also [20080010913](#); Original contains color and black and white illustrations

Report No.(s): Paper 6; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper describes the application of Knowledge-Based System (KBS) to tracking. Section 2 paves the way to the new technology by discussing the following topics: historical survey of stochastic filtering theory; overview of tracking systems with some details on mono-sensor and multi-sensor tracking, evolution of filtering logics, evolution of correlation logics, and presentation of recent findings on non linear filtering (e.g.: unscented Kalman filter, particle filter) theory which go beyond the classical Kalman filtering. After this introduction to the current state of the art, Section 3 discusses the new technology referred to as knowledge-based tracker : a tracker that exploits a-priori knowledge (e.g.: map data) to gain improved performance. Three applications follow: the first refers to the A-SMGCS (Advanced Surface Movement Guidance and Control System) for traffic control on the surface of an airport (section 4); in this case the target tracker is enhanced by exploiting the knowledge of the aerodrome map with runways, taxiways etc. The sensor is a high resolution surface based radar. The theme of section 5 is the tracking of ground moving or stationary vehicles using an airborne GMTI radar. Here we need to take care of the constraints imposed by the terrain (for which only uncertain data might be available), road networks and regions that could be not-trafficable. These information, also in this case, lead to finite support for the distribution of the target state; the classical Kalman filter doesn't work well and KBS tracker is needed. The last application (section 6) refers to tracking of airborne target masking itself in blind Doppler: these are Doppler frequency bands where the target cannot be detected due to the presence of MTI to reject ground clutter from radar echoes. This is a strategy that the pilot of an aircraft may implement to mask himself to an enemy radar. It is shown that particle filter can fruitfully exploit the a-priori information on blind Doppler thus keeping the probability of target track maintenance at a reasonable level also when the target pursues this masking strategy. An extensive list of references (section 9) is helpful to the Reader for a deeper insight to the many interesting topics of radar.

Author

Airborne Radar; Knowledge Based Systems; Tracking (Position); Air Traffic Control; Ground Effect (Communications); Target Masking; Radar Echoes; Kalman Filters

20080010921 Capraro Technologies, Inc., Utica, NY, USA

Fundamentals of Knowledge-Based Techniques

Capraro, Gerard T.; Knowledge-Based Radar Signal and Data Processing; September 2006, pp. 2-1 - 2-18; In English; See also [20080010913](#); Original contains color illustrations

Report No.(s): Paper 2; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper provides a brief overview of the fundamentals of Artificial Intelligence (AI) and Knowledge-Based (KB) techniques that we feel are necessary to understand the current research efforts being performed in knowledge base radar signal and data processing. A set of definitions and descriptions of some of the major areas of AI are presented. Examples are provided using radar terminology to illustrate concepts presented. Finally we present a description of those technologies being pursued by the World Wide Web Consortium (W3C) for building the Semantic Web or the next generation Internet. The Semantic Web is perceived by some as being a very large knowledge base.

Author

Knowledge Based Systems; Signal Processing; Artificial Intelligence; Radar Data

20080010922 Research and Technology Organization, Neuilly-sur-Seine, France

Radar Polarimetry and Interferometry

February 2007; In English; Lecture Series, 21-22 Mar. 2006, Warsaw, Poland; See also [20080010923](#) - [20080010935](#); Original contains color and black and white illustrations

Report No.(s): RTO-EN-SET-018bis; AC/323(SET-081)TP/58; Copyright; Avail.: CASI: [C01](#), CD-ROM

Polarimetric Radar Interferometry delivers and uses the most complete information which can be gained with Radar. The lectures address basics, advanced concepts and applications of polarimetric SAR Interferometry, and present different actual airborne and space-borne systems together with respective application examples. The Interferometry Lectures include cross track, along track, single and dual pass Interferometry, and differential as well as permanent scattering Interferometry. Lectures on Polarimetry basics include electromagnetic vector wave and polarization descriptors, vector wave scattering operators and

the polarimetric scattering matrices. The Polarimetric Radar optimization for coherence will be discussed as well as processing and image analysis, the most important decomposition theorems, a general formulation for vector wave Interferometry, its strong polarization dependence on the coherence, and an analytical solution for optimum polarization states that maximizes the interferometric capability of a SAR. A new coherent decomposition theorem for interferometric applications based on the singular value spectrum of a 3 x 3 complex matrix allowing the decomposition of problems into a set of coherent scattering mechanisms will be presented and a decomposition theorem for interferometric applications based on the singular value spectrum of a 3 x 3 complex matrix which allows the decomposition of problems into a set of coherent scattering mechanisms.

Author

Interferometry; Polarimetry; Synthetic Aperture Radar; Remote Sensing

20080010923 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koln, Germany

Polarimetric Interferometry - Target Detection Applications

Hellman, Martin; Cloude, Shane R.; Radar Polarimetry and Interferometry; February 2007, pp. 10-1 - 10-22; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In this section we consider the problem of radar detection of stationary targets obscured by foliage clutter. This is a classical detection problem for which the usual solution approach is to reduce the radar centre frequency as far as possible, so minimising scattering by the foliage while hopefully maintaining a significant target response. These approaches are based on backscatter intensity as the prime radar observable. In this paper we consider a new approach. Here we employ the phase of a radar interferometer as the prime observable and attempt the detection of targets by using the variation of phase with polarisation to reduce the foliage returns and maintain the target response. In section 2 we provide an introduction to polarimetric radar interferometry and consider the nature of the phase signal obtained in volume scattering. In section 3 we then extend this argument to consider the influence of a target on the observed phase and show how we can use this to develop a filter for enhanced target detection. In section 4 we describe a processing algorithm based on this analysis of volume scattering and in section 5 summarise the main components of a vector wave propagation and scattering model used to simulate coherent radar returns from targets embedded in foliage. In section 6 we present results from a simulation based on this model of corner reflectors embedded in a pine forest and demonstrate the ability of this technique to provide enhanced detection by showing raw and filtered signal channels for a cluster of hidden trihedral reflectors.

Author

Differential Interferometry; Backscattering; Coherent Radar; Radar Detection; Wave Propagation; Target Acquisition; Radar Corner Reflectors; Polarimetry

20080010924 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, Germany

Polarimetry and Interferometry Applications

Keydel, Wolfgang; Radar Polarimetry and Interferometry; February 2007, pp. 11-1 - 11-28; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Based on the foregoing lectures respective applications of both Polarimetry and Interferometry will be presented. From the large palette of possibilities which includes global mapping with space borne SAR and the establishment of digital terrain models with high accuracy, observation and to some extent prediction and forecast of natural disasters (involving landslides caused by earthquakes or avalanches, volcanic eruptions, fires, floods, terrain resurfacing, followed by a period of recovery, etc.), measurement of soil moisture, quantitative tree height determination and ground topography mapping and, as a consequence, the respective biomass estimation. Along track measurements allow moving target indication and traffic monitoring by evaluation of the position, time, velocity and direction of moving vehicles or finding traffic jams respectively. The question of optimal radar centre frequencies for different applications is addressed also.

Author

Polarimetry; Interferometry; Direction Finding; Minerals; Earthquakes; Volcanoes; Disasters

20080010925 UIC-ECE Communications, Chicago, IL, USA

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry

Boerner, Wolfgang-Martin; Radar Polarimetry and Interferometry; February 2007, pp. 12-1 - 12-30; In English; See also [20080010922](#); Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The development of Radar Polarimetry and Radar Interferometry is advancing rapidly, and these novel radar technologies

are revamping Synthetic Aperture Radar Imaging decisively. In this exposition the successive advancements are sketched; beginning with the fundamental formulations and high-lighting the salient points of these diverse remote sensing techniques. Whereas with radar polarimetry the textural fine-structure, target-orientation and shape, symmetries and material constituents can be recovered with considerable improvements above that of standard amplitude-only Polarization Radar ; with radar interferometry the spatial (in depth) structure can be explored. In Polarimetric-Interferometric Synthetic Aperture Radar (POL-in-SAR) Imaging it is possible to recover such co-registered textural plus spatial properties simultaneously. This includes the extraction of Digital Elevation Maps (DEM) from either fully Polarimetric (scattering matrix) or Interferometric (dual antenna) SAR image data takes with the additional benefit of obtaining co-registered three-dimensional POL-in-DEM information. Extra-Wide- Band POL-in-SAR Imaging - when applied to Repeat-Pass Image Overlay Interferometry - provides differential background validation and measurement, stress assessment, and environmental stress-change monitoring capabilities with hitherto unattained accuracy, which are essential tools for improved global biomass estimation. More recently, by applying multiple parallel repeat-pass EWB-POL-D(RP)-in-SAR imaging along stacked (altitudinal) or displaced (horizontal) flight-lines will result in Tomographic (Multi- Interferometric) Polarimetric SAR Stereo-Imaging , including foliage and ground penetrating capabilities. It is shown that the accelerated advancement of these modern EWB-POL-D(RP)-in-SAR imaging techniques is of direct relevance and of paramount priority to wide-area dynamic homeland security surveillance and local-to-global environmental ground-truth measurement and validation, stress assessment, and stress-change monitoring of the terrestrial and planetary covers.

Author

Synthetic Aperture Radar; Polarimetry; Interferometry; Surveillance; S Matrix Theory; Remote Sensing; Imaging Techniques; Environment Effects

20080010926 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koln, Germany

Polarimetric Interferometry

Hellman, Martin; Cloude, Shane R.; Radar Polarimetry and Interferometry; February 2007, pp. 8-1 - 8-14; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This lecture presents the role of Polarimetry in SAR Interferometry. A general formulation for vector wave interferometry is presented that includes conventional scalar interferometry presented in the respective former lecture as a special case. Based on this formulation, the coherence optimization problem can be solved to obtain the optimum scattering mechanisms that lead to the best phase estimates. Comparison with conventional single-polarization estimates illustrates the significant processing gains that are possible if there is access to full polarimetric interferometric data. A comparison with conventional single-polarization presented in former lectures illustrates the significant processing gains that are possible if access to full polarimetric interferometric data is possible. The strong polarization dependence of the coherence will be addressed and the analytical solution for optimum polarization states that maximize the interferometric coherence will be derived and applied to experimental data. These improved interferogrammes allow an improvement of the accuracy of derived DEM products. The introduction of a new coherent decomposition theorem for interferometric applications based on the Singular value spectrum of a 3×3 complex matrix allows the decomposition of polarimetric interferometric problems into a set of coherent scattering mechanisms. As a consequence, it is possible to generate interferograms related to certain independent scattering mechanisms and extract the height differences between them. The limitation of this technique is the existence of independent scattering mechanisms located at different height positions. To explain the physical origin of these mechanisms, a coherent electromagnetic scattering model will be established which, additionally, can be used to establish the suitability of the decomposition algorithm for solving the problem of estimating the location of the effective scattering center, which is a critical point in the physical interpretation of interferograms. However, these introduction of Polarimetry in interferometric processing requires that fully coherent polarimetric data must be collected in order to separate the scattering mechanisms.. In this connection polarimetric Differential Interferometry will be considered also. The phase difference between the optimum interferograms obtained by the application of the algorithm on the SIR-C data turned out to be strongly correlated with the actual forest height. This was a major result indicating the potential of the coherent combination of polarimetry and interferometry.

Author

Differential Interferometry; Shuttle Imaging Radar; Synthetic Aperture Radar; Polarimetry; Electromagnetic Scattering; Coherent Scattering

20080010927 UIC-ECE Communications, Chicago, IL, USA

Basics of SAR Polarimetry II

Boerner, Wolfgang-Martin; Radar Polarimetry and Interferometry; February 2007, pp. 4-1 - 4-30; In English; See also [20080010922](#); Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A comprehensive overview of the basic principles of radar polarimetry is presented. The relevant fundamental field equations are first provided. The importance of the propagation and scattering behavior in various frequency bands, the electrodynamic foundations such as Maxwell's equations, the Helmholtz vector wave equation and especially the fundamental laws of polarization will first be introduced: The fundamental terms which represent the polarization state will be introduced, defined and explained. Main points of view are the polarization Ellipse, the polarization ratio, the Stokes Parameter and the Stokes and Jones vector formalisms as well as its presentation on the Poincaré sphere and on relevant map projections. The Polarization Fork descriptor and the associated van Zyl polarimetric power density and Agrawal polarimetric phase correlation signatures will be introduced also in order to make understandable the polarization state formulations of electromagnetic waves in the frequency domain. The polarization state of electromagnetic waves under scattering conditions i.e. in the radar case will be described by matrix formalisms. Each scatterer is a polarization transformer; under normal conditions the transformation from the transmitted wave vector to the received wave vector is linear and this behavior, principally, will be described by a matrix called scattering matrix. This matrix contains all the information about the scattering process and the scatterer itself. The different relevant matrices, the respective terms like Jones Matrix, S-matrix, Muller M-matrix, Kennaugh K-matrix, etc. and its interconnections will be defined and described together with change of polarization bases transformation operators, where upon the optimal (Characteristic) polarization states are determined for the coherent and partially coherent cases, respectively. The lecture is concluded with a set of simple examples.

Author

Polarimetry; Synthetic Aperture Radar; Polarization (Waves); Electromagnetic Radiation; S Matrix Theory; Wave Equations; Maxwell Equation

20080010928 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, Germany

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry

Keydel, Wolfgang; Radar Polarimetry and Interferometry; February 2007, pp. 1-1 - 1-12; In English; See also [20080010922](#); Original contains color and black and white illustrations

Report No.(s): Paper 1; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Scientists and engineers already engaged in the fields of radar surveillance, reconnaissance and scattering measurements, for instance, generally gain their specialist knowledge in Polarimetry by working through scientific papers and specialised literature available on the subject. Usually, this is a time consuming exercise, as it is difficult for a newcomer to collate material especially on Polarimetry but also on Interferometry and related subjects. Presently, the treatment of basic Polarimetry concepts, in the currently available literature, lacks a coherent framework of theory, and, moreover, several basic definitions and conventions are not yet unified sufficiently under the light of physical principles. This Lecture Series is an attempt to readdress this problem. The aim of this Lecture Series is to provide a substantial and balanced introduction to the basic theory, scattering concepts, systems and applications typical to polarimetric and interferometric radar reconnaissance and surveillance, and to introduce the cutting-edge technologies, new ideas and methodologies as well. The following topics will be addressed: Basics, advanced concepts and applications of both radar Polarimetry and SAR Interferometry, cross track and along track Interferometry, single and dual pass Interferometry, differential interferometry, Interferometry errors and accuracy, polarimetric SAR processing and image analysis, decomposition theorems, polarimetric interferometry and polarimetric-interferometric SAR image analysis, processing principles, calibration, Polarimetric SAR analysis and applications, Digital Elevation Models, realized and future airborne and space-borne systems as Examples E-SAR, SIR-C/X-SAR, SRTM, ERS-1/2, RadarSAT, ENVISAT/ASAR, TerraSAR-X, Tandem-X, and CARTWHEEL.

Author

Polarimetry; Synthetic Aperture Radar; Radar Scattering; Digital Elevation Models; Shuttle Imaging Radar; Surveillance; Differential Interferometry; RADARSAT

20080010929 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koln, Germany

Polarimetric Interferometry - Remote Sensing Applications

Hellman, Martin; Cloude, Shane R.; Radar Polarimetry and Interferometry; February 2007, pp. 9-1 - 9-22; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This lecture is mainly based on the work of S.R. Cloude and presents examples for remote sensing applications Polarimetric SAR Interferometry (PolInSAR). PolInSAR has its origins in remote sensing and was first developed for applications in 1997 using SIRC L-Band data [1,2]. In its original form it involved generating phase differences between interferograms formed using different polarization combinations. Later these phase differences were observed to be correlated with vegetation height [2]. However, it was quickly realized that more accurate estimates of height could be obtained by correcting the phase differences using coherent wave scattering models [3,4,6]. Since then there have been several groups working on the development and inversion of suitable models for the interpretation of POLInSAR data. A particularly useful model, which presents a good compromise between physical structure and model complexity is a variant of that first developed by Treuhaft et al [3,4]. This 2-layer model is widely used in interferometric SAR (InSAR) applications. Here we review its main structure and importance in POLInSAR.

Author

Polarimetry; Coherent Scattering; Remote Sensing; Wave Scattering; Inversions; Ultrahigh Frequencies

20080010930 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, Germany

Normal and Differential SAR Interferometry

Keydel, Wolfgang; Radar Polarimetry and Interferometry; February 2007, pp. 2-1 - 2-40; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

SAR Interferometry explores the height structure inside a Radar pixel. Two antennas separated with a so called baseline distance B in cross velocity direction take two independent images from the same scene and compare the two phases which result from the same pixel at the two antennas. This phase differences compare to different distances between the pixel and the two antennas and from this difference the height of the respective pixel in relation to the altitude of the radar over a defined level can be determined. The Interferogramme formation will be explained and the respective terminology will be presented. In this context basic relations and important geometrical and electrodynamic system parameters will be presented and defined, the phase unwrapping will be considered as well as basic interferometry processing procedures and image formation principles. Coherence is the basis for Interferometry as well as a careful calibration. Therefore, the role of interferometric coherence for image interpretation will be shown. Errors caused by phase noise, de-correlation, co-registration misalignment, atmospheric disturbances, baseline limits, etc will be considered. They, principally, are the main reasons for coherence degradation. Different Interferometry modes Cross Track and Along Track Interferometry, single and dual pass Interferometry, Differential Interferometry, and Permanent Scattering Interferometry SAR will be discussed.

Author

Synthetic Aperture Radar; Differential Interferometry; Degradation; Electrodynamics; Image Processing; Calibrating; Errors

20080010931 UIC-ECE Communications, Chicago, IL, USA

Basics of SAR Polarimetry I

Boerner, Wolfgang-Martin; Radar Polarimetry and Interferometry; February 2007, pp. 3-1 - 3-40; In English; See also [20080010922](#); Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A comprehensive overview of the basic principles of radar polarimetry is presented. The relevant fundamental field equations are first provided. The importance of the propagation and scattering behavior in various frequency bands, the electrodynamic foundations such as Maxwell's equations, the Helmholtz vector wave equation and especially the fundamental laws of polarization will first be introduced: The fundamental terms which represent the polarization state will be introduced, defined and explained. Main points of view are the polarization Ellipse, the polarization ratio, the Stokes Parameter and the Stokes and Jones vector formalisms as well as its presentation on the Poincaré sphere and on relevant map projections. The Polarization Fork descriptor and the associated van Zyl polarimetric power density and Agrawal polarimetric phase correlation signatures will be introduced also in order to make understandable the polarization state formulations of electromagnetic waves in the frequency domain. The polarization state of electromagnetic waves under scattering conditions i.e. in the radar case will be described by matrix formalisms. Each scatterer is a polarization transformer; under normal conditions the transformation from the transmitted wave vector to the received wave vector is linear and this behavior, principally, will be

described by a matrix called scattering matrix. This matrix contains all the information about the scattering process and the scatterer itself. The different relevant matrices, the respective terms like Jones Matrix, S-matrix, Mueller M-matrix, Kennaugh K-matrix, etc. and its interconnections will be defined and described together with change of polarization bases transformation operators, where upon the optimal (Characteristic) polarization states are determined for the coherent and partially coherent cases, respectively. The lecture is concluded with a set of simple examples.

Author

Polarimetry; Electromagnetic Radiation; Poincare Spheres; Polarization (Waves); Ellipses; S Matrix Theory

20080010932 Rennes Univ., France

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification)

Pottier, Eric; Lee, Jon-Sen; Ferro-Famil, Laurent; Radar Polarimetry and Interferometry; February 2007, pp. 7-1 - 7-40; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

There is currently widespread interest in the development of radar sensors for the detection of surface and buried targets and the remote sensing of land, sea and ice surfaces. An important feature of electromagnetic radiation is its state of polarisation and a wide range of classification algorithms and inversion techniques have recently been developed based on the transformation of polarisation state by scattering objects. There are three primary ways in which multi-parameter radar measurements can be made: multi-frequency, single or multi-baseline interferometry and multi-polarization. While several airborne systems can now provide diversity over all three of these, it is the combination of polarimetry with interferometry at a single wavelength that forms the central focus of future challenges in developing new and original data processing. The main reason for this is the imminent launch of a series of advanced satellite radar systems such as PALSAR, an L-band SAR sensor on board the NASDA ALOS satellite and Radarsat II, a C-band polarimetric sensor. These are typical of a new generation of radars with the potential for providing data from various combinations of polarimetry and interferometry. This paper seeks to review recent progress in polarimetric and interferometric SAR data processing, covering advances and addressing the important topic of classification of polarimetric SAR data. Indeed, classification of Earth terrain components within a full polarimetric SAR image is one of the most important applications of Radar Polarimetry in Remote Sensing. However, the selection of radar frequency and polarization are two of the most important parameters in synthetic aperture radar (SAR) mission design. For a particular application, it is desirable to optimally select the frequency and combination of linear polarization channels, if a fully polarimetric SAR system is not possible, and to find out the expected loss in classification and geophysical parameter accuracy. In the first part of this tutorial, we quantitatively compare classification accuracies between fully polarimetric SAR data and partial polarimetric SAR data, for P-, L- and C-band frequencies. Additionally, to understand the importance of phase differences between polarizations, we compare the correct classification rates using the complex channels versus intensities channels.

Author

Polarimetry; Target Recognition; Synthetic Aperture Radar; Electromagnetic Radiation; Linear Polarization; Radar Detection; Radar Measurement; RADARSAT; Remote Sensing; Classifications

20080010933 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, Germany

Present and Future Airborne and Space-borne Systems

Keydel, Wolfgang; Radar Polarimetry and Interferometry; February 2007, pp. 13-1 - 13-28; In English; See also [20080010922](#); Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The state of the art of both airborne and space-borne SAR systems with polarimetric interferometry capability, their technological, system technical and application related specifications, and recent results obtained as well are presented shortly with respect to their relevance for Polarimetry and Interferometry capabilities. Space-borne SAR Interferometry in two pass mode reaches altitude accuracies of about 10 m and in one pass mode of < 6 m. With differential interferometry accuracies in the cm range have been obtained. In order to reach these values an exact system calibration is indispensable. The calibration of space-borne systems will be discussed using SRTM as an example. The future development of space-borne systems will be discussed shortly also.

Author

Differential Interferometry; Polarimetry; Calibrating

20080010934 Rennes Univ., France

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems)

Pottier, Eric; Lee, Jong-Sen; Ferro-Famil, Laurent; Radar Polarimetry and Interferometry; February 2007, pp. 6-1 - 6-30; In English; See also [20080010922](#); Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

There is currently a great deal of interest in the use of polarimetry for radar remote sensing. In this context, different and important objectives are to classify Earth terrain components within a fully polarimetric SAR image and then extract physical information from the observed scattering of microwaves by surface and volume structures. The most important observable measured by such radar systems is the 3x3-coherency matrix [T]. This matrix accounts for local variations in the scattering matrix and is the lowest order operator suitable to extract polarimetric parameters for distributed scatterers in the presence of additive (system) and/or multiplicative (speckle) noise. In the first part of this paper, the most important Target Polarimetry descriptors: Sinclair Matrix, target vectors, coherency matrix and the covariance matrix as well are presented, their interconnections and equivalences will be shown together with the respective transformations. Speckle appearing in synthetic aperture radar (SAR) images is due to the coherent interference of waves reflected from many elementary scatterers and causes degradation and makes automatic image segmentation and scene description difficult. The speckle reduction problem is more complicated for polarimetric SAR than a single polarization SAR, because of the difficulties of preserving polarimetric properties and of dealing with the cross-product terms. The first part of this paper is ended by a presentation and a description of polarimetric speckle filters preserving polarimetric properties and statistical correlation between channels, not introducing crosstalk, and not degrading the image quality. The impact of using this polarimetric speckle filtering on terrain classification is quite dramatic in boosting classification performance. Many targets of interest in radar remote sensing require a multivariate statistical description due to the combination of coherent speckle noise and random vector scattering effects from surface and volume. For such targets, it is of interest to generate the concept of an average or dominant scattering mechanism for the purposes of classification or inversion of scattering data. Target Decomposition theorems are aimed at providing such an interpretation based on sensible physical constraints such as the average target being invariant to changes in wave polarization basis. Among the existing Polarimetric Target Decomposition theorems - coherent (Krogager, Cameron ...), non-coherent (Huynen, Barnes ...) model-based decomposition (Freeman) or eigenvector-based decomposition (Cloude, Van Zyl) - the H/A/ Decomposition Theorem, proposed by S.R. Cloude and E. Pottier in 1997 for extracting average parameters from experimental data is presented and discussed. Based on an eigenvalues analysis of the coherency matrix, this decomposition theorem employs a 3-level Bernoulli statistical model to generate estimates of the average target scattering matrix parameters. 2

Author

Polarization Characteristics; Polarimetry; Radar Imagery; Synthetic Aperture Radar; Bernoulli Theorem; Classifications; Remote Sensing; Statistical Correlation

20080010935 UIC-ECE Communications, Chicago, IL, USA

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extrawideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications

Boerner, Wolfgang-Martin; Radar Polarimetry and Interferometry; February 2007, pp. 5-1 - 5-34; In English; See also [20080010922](#); Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The development of Radar Polarimetry and Radar Interferometry is advancing rapidly, and these novel radar technologies are revamping Synthetic Aperture Radar Imaging decisively. In this exposition the successive advancements are sketched; beginning with the fundamental formulations and high-lighting the salient points of these diverse remote sensing techniques. Whereas with radar polarimetry the textural fine-structure, target-orientation and shape, symmetries and material constituents can be recovered with considerable improvements above that of standard amplitude-only Polarization Radar ; with radar interferometry the spatial (in depth) structure can be explored. In Polarimetric-Interferometric Synthetic Aperture Radar (POL-in-SAR) Imaging it is possible to recover such co-registered textural plus spatial properties simultaneously. This includes the extraction of Digital Elevation Maps (DEM) from either fully Polarimetric (scattering matrix) or Interferometric (dual antenna) SAR image data takes with the additional benefit of obtaining co-registered three-dimensional POL-in-DEM information. Extra-Wide- Band POL-in-SAR Imaging - when applied to Repeat-Pass Image Overlay Interferometry - provides differential background validation and measurement, stress assessment, and environmental stress-change monitoring capabilities with hitherto unattained accuracy, which are essential tools for improved global biomass estimation. More recently, by applying multiple parallel repeat-pass EWB-POL-D(RP)-in-SAR imaging along stacked (altitudinal) or displaced

(horizontal) flight-lines will result in Tomographic (Multi-Interferometric) Polarimetric SAR Stereo-Imaging , including foliage and ground penetrating capabilities. It is shown that the accelerated advancement of these modern EWB-POL-D(RP)-in-SAR imaging techniques is of direct relevance and of paramount priority to wide-area dynamic homeland security surveillance and local-to-global environmental ground-truth measurement and validation, stress assessment, and stress-change monitoring of the terrestrial and planetary covers. In addition, various closely related topics of (i) acquiring additional and protecting existing spectral windows of the 'Natural Electromagnetic Spectrum (NES)' pertinent to Remote Sensing; (ii) mitigating against common 'Radio Frequency Interference (RFI)' and intentional 'Directive Jamming of Airborne & Space borne POL-in-SAR Imaging Platforms' are appraise

Author

Synthetic Aperture Radar; Polarimetry; Surveillance; Imaging Techniques; Ground Truth; Electromagnetic Spectra; Environment Effects

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*.

20080009623 NASA, Washington, DC USA

Increased alignment in carbon nanotube growth

Delzeit, Lance D., Inventor; October 30, 2007; 18 pp.; In English

Patent Info.: Filed December 7, 2004; US-Patent-7,288,490; US-Patent-Appl-SN-11/009,854; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009623>

Method and system for fabricating an array of two or more carbon nanotube (CNT) structures on a coated substrate surface, the structures having substantially the same orientation with respect to a substrate surface. A single electrode, having an associated voltage source with a selected voltage, is connected to a substrate surface after the substrate is coated and before growth of the CNT structures, for a selected voltage application time interval. The CNT structures are then grown on a coated substrate surface with the desired orientation. Optionally, the electrode can be disconnected before the CNT structures are grown.

Official Gazette of the U.S. Patent and Trademark Office

Alignment; Carbon Nanotubes; Coatings; Fabrication; Nanostructure Growth; Substrates

20080009624 NASA, Washington, DC USA

Conversion of type of quantum well structure

Ning, Cun-Zheng, Inventor; October 23, 2007; 9 pp.; In English

Patent Info.: Filed August 12, 2004; US-Patent-7,286,573; US-Patent-Appl-SN-10/923,160; No Copyright; Avail.: CASI:

A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009624>

A method for converting a Type 2 quantum well semiconductor material to a Type 1 material. A second layer of undoped material is placed between first and third layers of selectively doped material, which are separated from the second layer by undoped layers having small widths. Doping profiles are chosen so that a first electrical potential increment across a first layer-second layer interface is equal to a first selected value and/or a second electrical potential increment across a second layer-third layer interface is equal to a second selected value. The semiconductor structure thus produced is useful as a laser material and as an incident light detector material in various wavelength regions, such as a mid-infrared region.

Official Gazette of the U.S. Patent and Trademark Office

Quantum Wells; Semiconductors (Materials); Laser Materials

20080009628 California Inst. of Tech., Pasadena, CA USA

Multiple internal seal right micro-electro-mechanical system vacuum package

Hayworth, Ken J., Inventor; Yee, Karl Y., Inventor; Shcheglov, Kirill V., Inventor; Bae, Youngsam, Inventor; Wiberg, Dean V., Inventor; Challoner, A. Dorian, Inventor; Peay, Chris S., Inventor; October 23, 2007; 17 pp.; In English

Patent Info.: Filed June 10, 2004; US-Patent-7,285,844; US-Patent-Appl-SN-10/865,344; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009628>

A Multiple Internal Seal Ring (MISR) Micro-Electro-Mechanical System (MEMS) vacuum package that hermetically seals MEMS devices using MISR. The method bonds a capping plate having metal seal rings to a base plate having metal seal rings by wafer bonding the capping plate wafer to the base plate wafer. Bulk electrodes may be used to provide conductive paths between the seal rings on the base plate and the capping plate. All seals are made using only metal-to-metal seal rings deposited on the polished surfaces of the base plate and capping plate wafers. However, multiple electrical feed-through metal traces are provided by fabricating via holes through the capping plate for electrical connection from the outside of the package through the via-holes to the inside of the package. Each metal seal ring serves the dual purposes of hermetic sealing and providing the electrical feed-through metal trace.

Official Gazette of the U.S. Patent and Trademark Office

Microelectromechanical Systems; Vacuum; Seals (Stoppers); Fabrication

20080009632 Michigan Univ., Ann Arbor, MI USA

Thermal modulation for gas chromatography

Hasselbrink, Ernest F., Inventor; Libardoni, Mark, Inventor; Stewart, Kristine, Inventor; Waite, J. Hunter, Inventor; Block, Bruce P., Inventor; Sacks, Richard D., Inventor; October 23, 2007; 15 pp.; In English

Contract(s)/Grant(s): NAG5-12171

Patent Info.: Filed March 2, 2005; US-Patent-7,284,409; US-Patent-Appl-SN-11/070,796; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009632>

A thermal modulator device for gas chromatography and associated methods. The thermal modulator device includes a cooling member, an electrically conductive capillary in direct thermal contact with the cooling member, and a power supply electrically coupled to the capillary and operable for controlled resistive heating of the capillary.

Official Gazette of the U.S. Patent and Trademark Office

Gas Chromatography; Modulators; Temperature Control

20080009637 NASA, Washington, DC USA

Carbon nanotube-based sensor and method for detection of crack growth in a structure

Smits, Jan M., Inventor; Kite, Marlen T., Inventor; Moore, Thomas C., Inventor; Wincheski, Russell A., Inventor; Ingram, JoAnne L., Inventor; Watkins, Anthony N., Inventor; Williams, Phillip A., Inventor; October 9, 2007; 17 pp.; In English

Patent Info.: Filed June 15, 2005; US-Patent-7,278,324; US-Patent-Appl-SN-11/155,923; No Copyright; Avail.: CASI: A03,

Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009637>

A sensor has a plurality of carbon nanotube (CNT)-based conductors operatively positioned on a substrate. The conductors are arranged side-by-side, such as in a substantially parallel relationship to one another. At least one pair of spaced-apart electrodes is coupled to opposing ends of the conductors. A portion of each of the conductors spanning between each pair of electrodes comprises a plurality of carbon nanotubes arranged end-to-end and substantially aligned along an axis. Because a direct correlation exists between the resistance of a carbon nanotube and its strain, changes experienced by the portion of the structure to which the sensor is coupled induce a corresponding change in the electrical properties of the conductors, thereby enabling detection of crack growth in the structure.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Conductors; Crack Propagation; Detection; Substrates; Sensors

20080009640 NASA, Washington, DC USA

Functionalization of carbon nanotubes

Khare, Bishun N., Inventor; Meyyappan, Meyya, Inventor; October 2, 2007; 8 pp.; In English

Patent Info.: Filed December 13, 2002; US-Patent-7,276,266; US-Patent-Appl-SN-10/320,698; No Copyright; Avail.: CASI: [A02](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080009640>

Method and system for functionalizing a collection of carbon nanotubes (CNTs). A selected precursor gas (e.g., H.sub.2 or F.sub.2 or C.sub.nH.sub.m) is irradiated to provide a cold plasma of selected target particles, such as atomic H or F, in a first chamber. The target particles are directed toward an array of CNTs located in a second chamber while suppressing transport of ultraviolet radiation to the second chamber. A CNT array is functionalized with the target particles, at or below room temperature, to a point of saturation, in an exposure time interval no longer than about 30 sec.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Surface Properties; Chemical Composition; Nanotechnology

20080009642 NASA, Washington, DC USA

Nanoengineered thermal materials based on carbon nanotube array composites

Li, Jun, Inventor; Meyyappan, Meyya, Inventor; September 25, 2007; 16 pp.; In English

Patent Info.: Filed April 13, 2004; US-Patent-7,273,095; US-Patent-Appl-SN-10/825,795; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009642>

A method for providing for thermal conduction using an array of carbon nanotubes (CNTs). An array of vertically oriented CNTs is grown on a substrate having high thermal conductivity, and interstitial regions between adjacent CNTs in the array are partly or wholly filled with a filler material having a high thermal conductivity so that at least one end of each CNT is exposed. The exposed end of each CNT is pressed against a surface of an object from which heat is to be removed. The CNT-filler composite adjacent to the substrate provides improved mechanical strength to anchor CNTs in place and also serves as a heat spreader to improve diffusion of heat flux from the smaller volume (CNTs) to a larger heat sink.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Conductive Heat Transfer; Nanofabrication; Arrays

20080009646 Rochester Univ., NY USA

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis

King, Michael R., Inventor; Lomakin, Oleg, Inventor; Jones, Thomas B., Inventor; Ahmed, Rajib, Inventor; September 11, 2007; 10 pp.; In English

Contract(s)/Grant(s): NAG3-2744

Patent Info.: Filed July 26, 2005; US-Patent-7,267,752; US-Patent-Appl-SN-11/189,123; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009646>

Rapid, size-based, deposition of particles from liquid suspension is accomplished using a nonuniform electric field created by coplanar microelectrode strips patterned on an insulating substrate. The scheme uses the dielectrophoretic force both to distribute aqueous liquid containing particles and, simultaneously, to separate the particles. Size-based separation is found within nanoliter droplets formed along the structure after voltage removal. Bioparticles or macromolecules of similar size can also be separated based on subtle differences in dielectric property, by controlling the frequency of the AC current supplied to the electrodes.

Official Gazette of the U.S. Patent and Trademark Office

Particulates; Suspensions; Fractionation; Electrophoresis; Electric Fields; Deposition; Dielectrics

20080009740 NASA Glenn Research Center, Cleveland, OH, USA

Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls

McDowell, Mark, Inventor; September 11, 2007; 39 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 24 Feb. 2006; US-Patent-7,268,939; US-Patent-Appl-SN-11/363300; US-Patent-Appl-SN-11/053759; US-Patent-Appl-SN-11/645999; NASA-CASE-LEW-17484-5; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009740>

A Microscope Imaging System (CMIS) with intelligent controls is disclosed that provides techniques for scanning, identifying, detecting and tracking microscopic changes in selected characteristics or features of various surfaces including, but not limited to, cells, spheres, and manufactured products subject to difficult-to-see imperfections. The practice of the present invention provides applications that include colloidal hard spheres experiments, biological cell detection for patch

clamping, cell movement and tracking, as well as defect identification in products, such as semiconductor devices, where surface damage can be significant, but difficult to detect. The CMIS system is a machine vision system, which combines intelligent image processing with remote control capabilities and provides the ability to autofocus on a microscope sample, automatically scan an image, and perform machine vision analysis on multiple samples simultaneously

Official Gazette of the U.S. Patent and Trademark Office

Control Systems Design; Image Processing; Microscopes; Microscopy

20080009746 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Wireless Instrumentation System and Power Management Scheme Therefore

Perotti, Jose, Inventor; Lucena, Angel, Inventor; Eckhoff, Anthony, Inventor; Mata, Carlos T., Inventor; Blalock, Norman N., Inventor; Medelius, Pedro J., Inventor; September 25, 2007; 16 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 19 Dec. 2003; US-Patent-7,274,907; US-Patent-Appl-SN-10/748915; NASA-Case-KSC-12386; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009746>

A wireless instrumentation system enables a plurality of low power wireless transceivers to transmit measurement data from a plurality of remote station sensors to a central data station accurately and reliably. The system employs a relay based communications scheme where remote stations that cannot communicate directly with the central station due to interference, poor signal strength, etc., are instructed to communicate with other of the remote stations that act as relays to the central station. A unique power management scheme is also employed to minimize power usage at each remote station and thereby maximize battery life. Each of the remote stations preferably employs a modular design to facilitate easy reconfiguration of the stations as required.

Official Gazette of the U.S. Patent and Trademark Office

Sensors; Wireless Communication; Electric Power; Instruments

20080009748 NASA Ames Research Center, Moffett Field, CA, USA

Conversion of Type of Quantum Well Structure

Ning, Cun-Zheng, Inventor; October 23, 2007; 9 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 12 Aug. 2004; US-Patent-7,286,573; US-Patent-Appl-SN-10/923160; NASA-Case-ARC-15157-1; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009748>

A method for converting a Type 2 quantum well semiconductor material to a Type 1 material. A second layer of undoped material is placed between first and third layers of selectively doped material, which are separated from the second layer by undoped layers having small widths. Doping profiles are chosen so that a first electrical potential increment across a first layer-second layer interface is equal to a first selected value and/or a second electrical potential increment across a second layer-third layer interface is equal to a second selected value. The semiconductor structure thus produced is useful as a laser material and as an incident light detector material in various wavelength regions, such as a mid-infrared region.

Author

Laser Materials; Quantum Wells; Semiconductors (Materials)

20080009751 NASA Glenn Research Center, Cleveland, OH, USA

Hybrid Power Management System and Method

Eichenberg, Dennis J., Inventor; August 21, 2008; 8 pp.; In English; Original contains black and white illustrations
Patent Info.: Filed 1 Sep. 2004; US-Patent-7,259,692; US-Patent-Appl-10/931205; NASA-Case-LEW-17520-1; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009751>

A system and method for hybrid power management. The system includes photovoltaic cells, ultracapacitors, and pulse generators. In one embodiment, the hybrid power management system is used to provide power for a highway safety flasher.

Author

Management Systems; Photovoltaic Cells; Pulse Generators; Power; Electrochemical Capacitors

20080009766 Missouri Univ., Rolla, MO, USA

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques

Case, Joseph Tobias; 2005; 116 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NNM04AA15A; Copyright; Avail.: CASI: A06, Hardcopy

Microwave and millimeter wave nondestructive testing and evaluation (NDT&E) methods have shown great potential for

determining material composition in composite structures, determining material thickness or debond thickness between two layers, and determining the location and size of flaws, defects, and anomalies. The same testing methods have also shown great potential to produce relatively high-resolution images of voids inside Spray On Foam Insulation (SOFI) test panels using real focused methods employing lens antennas. An alternative to real focusing methods are synthetic focusing methods. The essence of synthetic focusing is to match the phase of the scattered signal to measured points spaced regularly on a plane. Many variations of synthetic focusing methods have already been developed for radars, ultrasonic testing applications, and microwave concealed weapon detection. Two synthetic focusing methods were investigated; namely, a) frequency-domain synthetic aperture focusing technique (FDSAFT), and b) wide-band microwave holography. These methods were applied towards materials whose defects were of low dielectric contrast like air void in SOFI. It is important to note that this investigation used relatively low frequencies from 8.2 GHz to 26.5 GHz that are not conducive for direct imaging of the SOFI. The ultimate goal of this work has been to demonstrate the capability of these methods before they are applied to much higher frequencies such as the millimeter wave frequency spectrum (e.g., 30-300 GHz).

Author

Microwave Imagery; Millimeter Waves; Synthetic Apertures; Microwave Holography; Imaging Techniques

20080009840 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Ion Focusing Improves Hall-Effect Thruster

Flinn, Edward D.; Aerospace America; September 2007; ISSN 0740-722X, pp. 24-25; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

Design engineers always consider tradeoffs. For example, they look for stronger, lighter materials to replace heavier ones. With electric propulsion (EP) devices, a key tradeoff involves exhaust velocity and thrust: A higher exhaust velocity means more energy is added to each unit mass of propellant, which leads to higher thruster efficiency, while higher thrust shortens the time to perform a maneuver. Because EP devices use electrical energy to accelerate the propellant, they achieve much higher exhaust velocities than chemical rocket engines. Yet because of spacecraft power limitations, EP devices normally do not have high thrust levels. Satellites are propelled to LEO by chemical rocket engines. These engines can then usually place a satellite into geosynchronous Earth orbit (GEO) in a matter of hours. Once a spacecraft is in orbit, its controllers on Earth rely on a combination of chemical and electric propulsion to handle station-keeping and repositioning of the satellite as needed.

Author

Hall Effect; Aerospace Engineering; Hall Thrusters; High Thrust; Ion Propulsion

20080009843 Industrial Coll. of the Armed Forces, Washington, DC USA

Electronics Industry

Bell, Robert; Carroll-Garrison, Martina; Donovan, Daniel; Fisher, John; Guemmer, Paul; Harms, Robert; Kelly, Timothy; Love, Mattie; McReynolds, James; Ward, Ralph; Jan 2006; 31 pp.; In English

Report No.(s): AD-A475296; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475296>

The electronics industry, led by the semiconductor sector, helped trigger one of the most significant economic, military, and social transformations since the Industrial Revolution, and there is every sign the tremendous rate of technological change will continue apace. Some industry observers have called for government intervention to reverse the overseas migration of U.S. semiconductor fabrication plants, to boost U.S. global competitiveness by funding basic research, and to encourage more college graduates in engineering and science fields. Government action to preserve strategic access to semiconductor producers is clearly needed to ensure DoD electronic systems can be built without compromising sensitive technology, though every effort should be made to minimize the cost by using commercial avenues whenever possible. While government actions to support basic research and improve competitiveness are warranted, other actions that attempt to counter global market forces would not succeed.

DTIC

Competition; Electronic Equipment; Industries; Military Technology; Policies; Semiconductors (Materials); United States

20080009875 Pacific Science and Engineering Group, Inc., San Diego, CA USA

Heuristic Automation for Decluttering Tactical Displays

St John, Mark; Smallman, Harvey S; Manes, Daniel I; Feher, Bela A; Morrison, Jeffrey G; Jan 2007; 18 pp.; In English

Report No.(s): AD-A475394; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475394>

Tactical displays can quickly become cluttered with large numbers of symbols that can compromise effective monitoring.

Here, we studied how heuristic automation can aid users by intelligently ‘decluttering’ the display. In a realistic simulated naval air defense task, 27 experienced U.S. Navy users monitored a cluttered airspace and executed defensive responses against significant threats. An algorithm continuously evaluated aircraft for their levels of threat and decluttered the less threatening ones by dimming their symbols. Users appropriately distrusted and spot-checked the automation’s assessments, and decluttering had very little effect on which aircraft were judged as significantly threatening. Nonetheless, decluttering improved the timeliness of responses to threatening aircraft by 25% as compared with a baseline display with no decluttering; it was especially beneficial for threats in more peripheral locations, and 25 of 27 participants preferred decluttering. Heuristic automation, when properly designed to guide users attention by decluttering less important objects, may prove valuable in many cluttered monitoring situations, including air traffic management, crisis team management, and tactical situation awareness in general.

DTIC

Clutter; Display Devices; Heuristic Methods

20080009891 Florida Univ., Gainesville, FL USA

Wireless Cooperative Networks: Self-Configuration and Optimization

Yang, Liuqing; Oleson, Roslyn S; Jan 10, 2008; 5 pp.; In English

Contract(s)/Grant(s): N00014-07-1-0868

Report No.(s): AD-A475442; 1; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475442>

In wireless sensor networks, relay transmissions can enable cooperative diversity by forming virtual antenna arrays. The optimum resource allocation in such systems is critical to enhance their error rate performance and energy efficiency. Existing work often focus on the optimization of the energy allocation among the source and relay nodes. This is not only undesirable from the relays’ point of view especially when they are required to transmit at high power levels, but also impossible at times since the sensor nodes are each limited by their individual battery capacity. On the other hand, the source is very likely to have multiple candidates to choose from. In a mobile sensor network, the relay nodes can also move to desirable locations to better assist the communication from the source node to the destination node. In order to exploit the freedom in terms of relay location, we treat the resource allocation in relay networks as a two-dimensional (energy and location) optimization problem and establish some very interesting results. To facilitate the implementation of such an optimum strategy, we also investigated precise localization techniques for wireless sensor networks.

DTIC

Communication Networks; Information Systems; Wireless Communication

20080009894 New Mexico Univ., Albuquerque, NM USA

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure

Smith, K A; Nov 30, 2007; 6 pp.; In English

Contract(s)/Grant(s): FA9550-07-1-0106

Report No.(s): AD-A475445; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475445>

The objective of this work was to determine if Solid-State Nuclear Magnetic Resonance (NMR) would be able to determine what chemical or structural changes occur during treatment of carbon fibers by CsI, and during operation of treated cathodes. It was known that CsI treated carbon fibers are superior to either solid CsI or untreated fibers when used as cathodes for high power microwave production. For C-13 NMR, probe background was a major problem. Even after efforts to remove it, the signals were very broad. There was useful difference between samples. I-127 spectra were obtained from standards and treated cathodes. The iodine that is seen appears to be CsI. However, it is possible that not all the iodine is being observed. Cs-133 is less sensitive than either carbon-13 or iodine-127, and no signals were seen from samples. Electron spin resonance (ESR) was also run, and there is some indication of radical formation during cathode use. Based on these results, it does not appear that Solid-State NMR is a useful tool in investigating these systems.

DTIC

Carbon Fibers; Cathodes; Electron Paramagnetic Resonance; Microwave Tubes; Nuclear Magnetic Resonance; Solid State; Tube Cathodes

20080010732 NASA Johnson Space Center, Houston, TX, USA

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station

Gilmore, Adam; Schmitt, Chris; Merritt, Laura; Bolton, V. J.; [2008]; 12 pp.; In English; 39th Aerospace Mechanisms

Symposium, 7-9 May 2008, Houston, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

In December of 2005, one of two trailing umbilical cables used on the International Space Station (ISS) Mobile Transporter (MT) was inadvertently severed by an internal cutter system designed to free a snagged cable or jammed reel while transporting hazardous payloads. The mechanism s intended means of actuation is electrical; however, troubleshooting revealed a mechanical actuation occurred. The investigation of the failed component revealed several lessons learned in developing hardware requirements, understanding and following the rationale behind the requirements throughout the design life cycle, understanding the impacts of gaps and tolerances in a mechanism, and the importance of identifying critical steps during assembly.

Author

International Space Station; Actuators; Disconnect Devices; Cables; Structural Failure; Transporter

20080010740 Dayton Univ., OH USA

Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint)

McCarty, R; Monaghan, D; Hallinan, K P; Sanders, B; Dec 2007; 18 pp.; In English

Contract(s)/Grant(s): Proj-A03Q

Report No.(s): AD-A475571; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper provides a description of research seeking to experimentally verify the effectiveness of a thermal switch used in series with TE devices for waste heat recovery for constant and variable source heat input and for variable source thermal capacitance (mass). Using an experimental set-up comprised serially of a fixed heat source, a variable thermal resistance air gap serving as a thermal switch, a thermoelectric device and a heat sink, the time-averaged power output to power input ratios improved up to 15% and 30% respectively for constant and variable heat input in certain design space conditions. The experimental results, as supported by model predictions, suggest that the thermal capacitance of the heat source must be greater than the thermal capacitance of the TE device in order for thermal switching to improve the time-averaged power output to power input ratios of waste heat recovery systems. The results have direct application to aircraft energy harvesting. DTIC

Modulation; Switches; Thermal Energy; Thermoelectricity

20080010772 Army Natick Soldier Center, Natick, MA USA

Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers

Bosselman, Suzanne; Sep 2007; 20 pp.; In English

Contract(s)/Grant(s): Proj-A91A

Report No.(s): AD-A475402; NATICK/TR-07/022; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475402>

The fundamental behavior of electrically-conductive, silver-coated nylon fibers was studied to understand the relationship between the fiber composition and morphology, tensile behavior, and electrical resistance in the strained state, as well as the post-strained or post-damaged state. Environmental effects on electrical resistance were also studied including immersion in aqueous solutions of various pH levels, as well as exposure to elevated temperatures and thermal cycling. Samples of continuous filament yarns (100 denier base nylon fiber, 34 filaments) were obtained from Saquoit Industries, Scranton, Pennsylvania. The work on the silver/nylon fiber reported here is part of an overall research program that addresses the fundamental electrical and mechanical properties of conductive textile materials.

DTIC

Coatings; Mechanical Properties; Nylon (Trademark); Silver

20080010783 Industrial Coll. of the Armed Forces, Washington, DC USA

Energy Industry, 2006

Jan 2006; 30 pp.; In English

Report No.(s): AD-A475301; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475301>

America's energy supply portfolio is influenced by a complicated blend of economics, national security, and diplomacy that transcend our borders. The rapid globalization of markets, shifting political alliances and increasingly intertwined layers of dependency, make even the most reasonable public policy decisions concerning energy subject to intense domestic and

international scrutiny and perhaps unintended repercussions. The energy industry is in the midst of unprecedented geopolitical and economic uncertainty that requires a broad understanding of individual sectors in order to make coherent national security decisions. The fragility of the electrical grid, the increasing reliance on imported oil in order to sustain our transportation infrastructure, and the call for alternative and renewable energy sources to reduce oil dependency and reduce global greenhouse emissions, are examples of issues that cannot be solved in isolation. As a result, the 2006 ICAF Energy Industry Study seminar assessed domestic and international energy security by addressing five main themes: security, regulation, diversity of supply, efficiency/conservation, and leadership/public education. The seminar traveled to energy manufacturers, suppliers, distributors, researchers, educators, and regulators in Northern Virginia, Maryland, Pennsylvania, the greater San Francisco valley, and throughout Australia in order to obtain candid industry, academic and governmental assessments of major energy sectors. This report reviews the Energy Industry Study Study's research findings, and provides recommendations for policy makers to consider when prioritizing programs and funding for research, development, and infrastructure support vital to America's energy security.

DTIC

Industries; Energy Technology; Domestic Energy; Renewable Energy; Market Research

20080010840 Massachusetts Univ., Amherst, MA USA

Proceedings of the 2007 Antenna Applications Symposium. Volume 2

Schaubert, Daniel; Dec 20, 2007; 300 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33615-02-D-1283

Report No.(s): AD-A475333; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475333>

The Proceedings of the 2007 Antenna Applications Symposium is a collection of state-of-the art papers relating to antenna arrays, millimeter wave antennas, simulation and measurement of antennas, integrated antennas, and antenna bandwidth and radiation improvements.

DTIC

Antennas; Conferences

20080010841 Massachusetts Univ., Amherst, MA USA

Proceedings of the 2007 Antenna Applications Symposium, Volume 1

Schaubert, Daniel; Dec 1, 2007; 281 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33615-02-D-1283

Report No.(s): AD-A475327; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475327>

The Proceedings of the 2007 Antenna Applications Symposium is a collection of state-of-the art papers relating to antenna arrays millimeter wave antennas simulation and measurement of antennas integrated antennas and antenna bandwidth and radiation improvements.

DTIC

Aircraft Antennas; Antenna Arrays; Beamforming; Conferences; Millimeter Waves

20080010852 NASA Glenn Research Center, Cleveland, OH, USA

Test Results From a Simulated High-Voltage Lunar Power Transmission Line

Birchough, Arthur; Hervol, David; January 2008; 15 pp.; In English; Space Technology and Applications International Forum (STAIF -2008), 10-14 Feb. 2008, Albuquerque, NM, USA; Original contains color illustrations

Contract(s)/Grant(s): NNC06BA07B; WBS 463169.04.03

Report No.(s): NASA/TM-2008-215164; E-16406; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010852>

The Alternator Test Unit (ATU) in the Lunar Power System Facility (LPSF) located at the NASA Glenn Research Center (GRC) in Cleveland, Ohio was modified to simulate high-voltage transmission capability. The testbed simulated a 1 km transmission cable length from the ATU to the LPSF using resistors and inductors installed between the distribution transformers. Power factor correction circuitry was used to compensate for the reactance of the distribution system to improve the overall power factor. This test demonstrated that a permanent magnet alternator can successfully provide high-frequency ac power to a lunar facility located at a distance.

Author

High Voltages; Transmission Lines; Simulation; Electric Power; AC Generators

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*.

20080009757 NASA Langley Research Center, Hampton, VA, USA

Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited)

Owens, D. Bruce; Brandon, Jay M.; Croom, Mark A.; Fremaux, C. Michael; Heim, Eugene H.; Vicroy, Dan D.; June 05, 2006; 34 pp.; In English; 25th AIAA Aerodynamic Measurement Technology and Ground Testing Conference, 5-8 Jun. 2006, San Francisco, CA, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 457280.02.07.07

Report No.(s): AIAA Paper-2006-3146; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009757>

An overview of dynamic test techniques used at NASA Langley Research Center on scale models to obtain a comprehensive flight dynamics characterization of aerospace vehicles is presented. Dynamic test techniques have been used at Langley Research Center since the 1920s. This paper will provide a partial overview of the current techniques available at Langley Research Center. The paper will discuss the dynamic scaling necessary to address the often hard-to-achieve similitude requirements for these techniques. Dynamic test techniques are categorized as captive, wind tunnel single degree-of-freedom and free-flying, and outside free-flying. The test facilities, technique specifications, data reduction, issues and future work are presented for each technique. The battery of tests conducted using the Blended Wing Body aircraft serves to illustrate how the techniques, when used together, are capable of characterizing the flight dynamics of a vehicle over a large range of critical flight conditions.

Author

Dynamic Tests; Scale Models; General Overviews; Aerospace Vehicles; Wind Tunnel Tests; Aerodynamics

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*.

20080009635 QorTek, Inc., Williamsport, PA USA

Thin, nearly wireless adaptive optical device

Knowles, Gareth, Inventor; Hughes, Eli, Inventor; October 16, 2007; 14 pp.; In English

Contract(s)/Grant(s): NAS5-03014

Patent Info.: Filed June 21, 2004; US-Patent-7,281,808; US-Patent-Appl-SN-10/872,974; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009635>

A thin, nearly wireless adaptive optical device capable of dynamically modulating the shape of a mirror in real time to compensate for atmospheric distortions and/or variations along an optical material is provided. The device includes an optical layer, a substrate, at least one electronic circuit layer with nearly wireless architecture, an array of actuators, power electronic switches, a reactive force element, and a digital controller. Actuators are aligned so that each axis of expansion and contraction intersects both substrate and reactive force element. Electronics layer with nearly wireless architecture, power electronic switches, and digital controller are provided within a thin-film substrate. The size and weight of the adaptive optical device is solely dominated by the size of the actuator elements rather than by the power distribution system.

Official Gazette of the U.S. Patent and Trademark Office

Adaptive Optics; Mirrors; Optical Equipment; Optical Materials; Real Time Operation; Distortion

20080009645 NASA, Washington, DC USA

Tracking of cells with a compact microscope imaging system with intelligent controls

McDowell, Mark, Inventor; September 11, 2007; 39 pp.; In English

Patent Info.: Filed February 24, 2006; US-Patent-7,268,939; US-Patent-Appl-SN-11/363,300; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009645>

A Microscope Imaging System (CMIS) with intelligent controls is disclosed that provides techniques for scanning,

identifying, detecting and tracking microscopic changes in selected characteristics or features of various surfaces including, but not limited to, cells, spheres, and manufactured products subject to difficult-to-see imperfections. The practice of the present invention provides applications that include colloidal hard spheres experiments, biological cell detection for patch clamping, cell movement and tracking, as well as defect identification in products, such as semiconductor devices, where surface damage can be significant, but difficult to detect. The CMIS system is a machine vision system, which combines intelligent image processing with remote control capabilities and provides the ability to auto-focus on a microscope sample, automatically scan an image, and perform machine vision analysis on multiple samples simultaneously.

Official Gazette of the U.S. Patent and Trademark Office

Microscopy; Image Processing; Artificial Intelligence; Cells (Biology); Computer Vision; Optical Tracking

20080009647 NASA, Washington, DC USA

Atmospheric autorotating imaging device

Burke, James D., Inventor; December 12, 1989; 6 pp.; In English

Patent Info.: Filed June 13, 1988; US-Patent-4,886,222; US-Patent-Appl-SN-205899; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009647>

An imaging device that automatically rotates upon descent through an atmosphere provides an onboard image detector a sweeping panoramic scan as it descends. No moving parts or propulsion system are required. The location, angle and pitch of the winged structure, together with its inertia properties, passively induces rotation. The angled location of the image detector takes advantage of the resulting rotation. Data generated by the image detector may be transmitted to a remote receiver or, alternatively, stored for subsequent recovery.

Official Gazette of the U.S. Patent and Trademark Office

Panoramic Scanning; Autorotation; Imaging Techniques

20080009649 NASA, Washington, DC USA

Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment

Buck, Gregory M., Inventor; December 5, 1989; 6 pp.; In English

Patent Info.: Filed June 13, 1988; US-Patent-4,885,633; US-Patent-Appl-SN-205900; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009649>

A thermal imaging system provides quantitative temperature information and is particularly useful in hypersonic wind tunnel applications. An object to be measured is prepared by coating with a two-color, ultraviolet-activated, thermographic phosphor. The colors emitted by the phosphor are detected by a conventional color video camera. A phosphor emitting blue and green light with a ratio that varies depending on temperature is used so that the intensity of light in the blue and green wavelengths detected by the blue and green tubes in the video camera can be compared. Signals representing the intensity of blue and green light at points on the surface of a model in a hypersonic wind tunnel are used to calculate a ratio of blue to green light intensity which provides quantitative temperature information for the surface of the model.

Official Gazette of the U.S. Patent and Trademark Office

Thermography; Phosphors; Thermal Mapping; Video Equipment; Temperature Measurement; Surface Temperature; Hypersonic Wind Tunnels

20080009654 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001

Green, Robert O.; Eastwood, Michael; McCubbin, Ian; Chovit, Chris; Raney, Jim; Holbrook, Jack; November 6, 2001; 11 pp.; In English; EO-1 Arentina Summer Field Campaign Workshop, 6-8 Nov. 2001, Buenos Aires, Argentina; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/40611>

This document presents an overview of Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) acquisitions in Argentina. The document initially discusses imaging spectroscopy, spectrum measurement, the AVIRIS instrument and AVIRIS performance. Additionally, AVIRIS imaging collection activities since its deployment to Argentina in January of 2001 are briefly cited.

Derived from text

Airborne Equipment; Infrared Imagery; Infrared Spectrometers; Spectroscopy; Imaging Spectrometers; Metric Photography; Data Acquisition

20080009704 NASA Johnson Space Center, Houston, TX, USA

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach

Papanyan, Valeri; Oshle, Edward; Adamo, Daniel; [2008]; 13 pp.; In English; Sensors and Systems for Space Applications, 17-20 Mar. 2008, Orlando, FL, USA; Original contains color illustrations

Contract(s)/Grant(s): NNNJ05HI0SC

Report No.(s): Paper Number 6958-17; Copyright; Avail.: CASI: [A03](#), Hardcopy

Measurement of the jettisoned object departure trajectory and velocity vector in the International Space Station (ISS) reference frame is vitally important for prompt evaluation of the object's imminent orbit. We report on the first successful application of photogrammetric analysis of the ISS imagery for the prompt computation of the jettisoned object's position and velocity vectors. As post-EVA analyses examples, we present the Floating Potential Probe (FPP) and the Russian 'Orlan' Space Suit jettisons, as well as the near-real-time (provided in several hours after the separation) computations of the Video Stanchion Support Assembly Flight Support Assembly (VSSA-FSA) and Early Ammonia Servicer (EAS) jettisons during the US astronauts space-walk. Standard close-range photogrammetry analysis was used during this EVA to analyze two on-board camera image sequences down-linked from the ISS. In this approach the ISS camera orientations were computed from known coordinates of several reference points on the ISS hardware. Then the position of the jettisoned object for each time-frame was computed from its image in each frame of the video-clips. In another, 'quick-look' approach used in near-real time, orientation of the cameras was computed from their position (from the ISS CAD model) and operational data (pan and tilt) then location of the jettisoned object was calculated only for several frames of the two synchronized movies. Keywords: Photogrammetry, International Space Station, jettisons, image analysis.

Author

Photogrammetry; Trajectories; Cameras; International Space Station; Extravehicular Activity; Image Analysis; Cosmic Ray Showers

20080009773 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing

Sidick, Erkin; Green, Joseph J.; Ohara, Catherine M.; Redding, David C.; June 18, 2007; 18 pp.; In English; Signal Recovery and Synthesis (SRS) Topical Meeting, 18-20 Jun. 2007, Vancouver, British Columbia, Canada; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/40573>

This viewgraph presentation reviews the Adaptive Cross-Correlation (ACC) Algorithm for extended scene-Shack Hartmann wavefront (WF) sensing. A Shack-Hartmann sensor places a lenslet array at a plane conjugate to the WF error source. Each sub-aperture lenslet samples the WF in the corresponding patch of the WF. A description of the ACC algorithm is included. The ACC has several benefits; amongst them are: ACC requires only about 4 image-shifting iterations to achieve 0.01 pixel accuracy and ACC is insensitive to both background light and noise much more robust than centroiding,

CASI

Algorithms; Cross Correlation; Detection; Wave Fronts

20080009978 Washington Univ., Saint Louis, MO USA

Polarization Diversity for Detecting Targets in Inhomogeneous Clutter

Hurtado, Martin; Nehorai, Arye; Jan 2007; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-0443; FA9550-05-1-0018

Report No.(s): AD-A475555; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Polarization diversity has proved to be a useful tool for radar detection, especially when discrimination by Doppler effect is not possible. In this paper, we address the problem of improving the performance of polarimetric detectors for targets in heavy inhomogeneous clutter. First, we develop a polarimetric detection test that is robust to inhomogeneous clutter. We run this polarimetric test against synthetic and real data to assess its performance in comparison with existing polarimetric detectors. Then, we propose a polarimetric waveform-design algorithm to further improve the target-detection performance. A numerical analysis is presented to demonstrate the potential performance improvement that can be achieved with this algorithm.

DTIC

Clutter; Detection; Target Acquisition; Targets

20080009995 Washington Univ., Saint Louis, MO USA

Polarimetric Detection of Targets in Inhomogeneous Clutter

Hurtado, Martin; Nehorai, Arye; Jan 2007; 7 pp.; In English

Contract(s)/Grant(s): FA9550-05-1-0443; FA9550-05-1-0018

Report No.(s): AD-A475588; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Polarization diversity in radar is useful to detect targets, particularly when Doppler discrimination is not possible. We introduce a new polarimetric radar model that includes the realistic dependence of the clutter reflections on the transmitted signal. We then develop a statistical polarimetric detection test, robust to heavy inhomogeneous clutter. We prove that the detector's false-alarm rate is invariant to the space and time variabilities of the clutter; hence, it has the constant false-alarm (CFAR) property, while still maintaining a good probability of detection. We demonstrate the improved performance of the proposed detector in comparison with existing detectors using numerical examples and real data.

DTIC

Clutter; Detection; Polarimetry; Radar; Target Acquisition

20080010002 Arizona State Univ., Tempe, AZ USA

Waveform-Agile Tracking In Heavy Sea Clutter

Sira, Sandeep P; Papandreou-Suppappola, Antonia; Morrell, Darryl; Cochran, Douglas; Jan 2007; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00173-06-1-G006

Report No.(s): AD-A475607; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The detection and tracking of small targets on the ocean surface is a challenging problem due to low signal-to-clutter ratio (SCR) that results from low grazing angles and high sea state. Recent advances in sensing technologies have enabled waveform-agile schemes that tailor the sensor waveform to match the overall sensing objective. In this paper, we propose a methodology to dynamically adapt the transmitted waveform to improve the tracking performance for scenarios characterized by heavy sea clutter. Employing the compound-Gaussian model for sea clutter, we develop an algorithm for online design of a phase-modulated waveform that improves the SCR in a range bin of interest. A particle filter tracker uses the measurements obtained by this waveform to estimate the target state. We present a simulation study to demonstrate that our scheme leads to improved tracking performance.

DTIC

Clutter; Seas; Waveforms

20080010717 Defence Research and Development Canada, Ottawa, Ontario Canada

Evaluation of Simulated RADARSAT-2 Polarimetry Products

Liu, Chen; Vachon, Paris W; Sep 2007; 78 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475321; DRDC-TM-2007-189; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475321>

This report presents an evaluation of simulated RADARSAT-2 polarimetry products. The RSAT2SIMU software developed by MDA simulates RADARSAT-2 products from Environment Canada (EC) CV-580 synthetic aperture radar (SAR) single-look complex (SLC) data by increasing the noise floor and degrading the image resolution. The evaluation includes observations of the reduction in the probability of missed detection for polarimetric relative to single channel radar operation for ship detection, and the potential benefit of polarimetric target decomposition to generate ship target classification features and to segment the ship target of interest from the ocean background. A main recommendation is to develop algorithms that combine all information available from polarimetric signature analysis methods to aid in ship classification. The results show that the ship detection and target classification methods developed using airborne polarimetric data can potentially be applied to RADARSAT-2 data.

DTIC

C Band; Polarimetry; RADARSAT; Synthetic Aperture Radar

20080010723 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

A Novel Detector of Broadband Transient Signals

Sildam, Juri; Nov 2006; 54 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475334; DRDC-A-TM-2006-258; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475334>

A novel approach for detection of broad-band (BB) transients (DBBT) is proposed. DBBT is based on an analysis of the

spectrograms, calculated from time series of one or more hydrophones. A spectrogram is divided into locally normalized time-frequency cells (TFC). Two TFCs, which are measured at the same time but at different neighboring frequencies, are said to include a signature of a broad-band transient signal if their empirical centres of masses estimated in a higher-dimensional feature space using a Gaussian kernel exhibit correlation higher than a predefined threshold. A spread coefficient p of a Gaussian kernel is chosen so that the correlation between the pairs of centres of masses of TFCs that do not include transient signatures appear to be uncorrelated. Tests of BB transient detection, carried out using a number of real-world data sets, demonstrate robustness of the proposed method. In particular, DBBT was able to detect the launch and explosion of a torpedo, the start and stop of small boat engine, and other events. Reusable values of size of TF cells, a p value, and correlation threshold were used. The same settings were also successfully used with two sets of torpedo and ship measurements artificially combined at different bearings within a framework of simulated beam-forming. The results were found to be relatively insensitive to the array shape and target bearing errors. A few tests that were carried out on artificially generated narrowband signals using modified DBBT were found to be too limited and therefore inconclusive.

DTIC

Broadband; Detectors; Spectrograms

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*.

20080009835 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

A High Power Frequency Doubled Fiber Laser

Thompson, Robert J.; Tu, Meirong; Aveline, Dave; Lundblad, Nathan; Maleki, Lute; May 20, 2003; 13 pp.; In English; The Division of Atomic, Molecular, and Optical Physics (DAMOP) of the American Physical Society Conference, 20 May 2003, Boulder, CO, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/40615>

This viewgraph presentation reports on the development of a high power 780 nm laser suitable for space applications of laser cooling. A possible solution is to use frequency doubling of high power 1560 nm telecom lasers. The presentation shows a diagram of the frequency conversion, and a graph of the second harmonic generation in one crystal, and the use of the cascading crystals. Graphs show the second harmonic power as a function of distance between crystals, second harmonic power vs. pump power, tunability of laser systems.

CASI

Fiber Lasers; High Power Lasers; Laser Cooling; Laser Outputs; Tunable Lasers

20080010707 Texas A&M Univ., College Station, TX USA

Quantum Optics Initiative

Scully, Marlan O; Jun 30, 2007; 58 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0639

Report No.(s): AD-A475611; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The purpose of this research is to adapt the latest forefront research in the area of quantum optics to address the more challenging technical problems needed to support the warfighter in today's rapidly changing rules of engagement, and homeland security in the face of new threats. To do this we will align technology push in areas where we have unique expertise with applications pull in several key areas of national need.

DTIC

Lasers; Quantum Optics; Security

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*.

20080009641 NASA, Washington, DC USA

Friction stir weld tools

Carter, Robert W., Inventor; Payton, Lewis N., Inventor; October 2, 2007; 8 pp.; In English

Patent Info.: Filed August 20, 2004; US-Patent-7,275,675; US-Patent-Appl-SN-10/928,876; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009641>

A friction stir weld tool sleeve is supported by an underlying support pin. The pin material is preferably selected for toughness and fracture characteristics. The pin sleeve preferably has a geometry which employs the use of an interrupted thread, a plurality of flutes and/or eccentric path to provide greater flow through. Paddles have been found to assist in imparting friction and directing plastic metal during the welding process.

Official Gazette of the U.S. Patent and Trademark Office

Friction Stir Welding; Pins; Sleeves

20080009660 NASA Marshall Space Flight Center, Huntsville, AL, USA

Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe

Blackmon, James B.; Entrekin, Sean F.; January 2006; 7 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NNM05AA22A; NCC8-200; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009660>

This note on preliminary results of our evaluation of the so-called Qu Tube is prompted in part by recent concerns expressed to the authors by some researchers regarding the performance characteristics of the superconducting, solid-state heat pipe as described in the patents, or on the company's websites. Briefly, the company's claims include: a new type of heat transfer mechanism that is a form of solid state thermal superconductivity, which results in an effective thermal conductivity of the order of tens of thousands of times that of an equivalent solid silver bar, or, tens to hundreds of times that of liquid - vapor heat pipes. The company's website also refers to tests conducted by Stanford Research Institute that substantiate these claims, but the report is apparently not publicly available. We are conducting an investigation of the Qu Tube under a NASA Grant, and in general find that these claims have merit, but our study is not yet complete. We present some of our preliminary results in part to show that it would not be imprudent to conduct such studies, especially for possible future applications requiring exceptional thermal management performance capabilities. Working with HiTek Services, we originally acquired several Qu Tubes, including 17' long, 5/16' diameter copper tubes, one that is 7 7/8' long, 3/16' diameter, and one that is 4' long, 1' diameter. We subjected the smaller tubes to various exploratory tests, including a transient test with electrical band heaters, boiling water tests, and a series of steady state tests with electrical band heaters heating one end with free convective cooling along the remainder of the length. All results indicate a very high thermal conductivity, but the length of these tubes limited our ability to obtain accurate data on temperature gradients, necessary to determine the effective thermal conductivity. We then acquired nine Qu Tubes that are 10' long, 5/16' diameter, and we have recently conducted initial tests, which further support the claims of exceptional thermal conductivity.

Author

Heat Pipes; Superconductivity; High Temperature Tests; Thermal Conductivity; Copper; Pipes (Tubes)

20080009743 NASA Marshall Space Flight Center, Huntsville, AL, USA

Cushion System for Multi-Use Child Safety Seat

Dabney, Richard W., Inventor; Elrod, Susan V., Inventor; October 23, 2007; 7 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 28 Jan. 2005; US-Patent-7,284,792; US-Patent-Appl-SN-11/047342; NASA-Case-MFS-31771-1; No Copyright; Avail.: CASI: A02, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009743>

A cushion system for use with a child safety seat has a plurality of bladders assembled to form a seat cushion that cooperates with the seat's safety harness. One or more sensors coupled to the safety harness sense tension therein and generate a signal indicative of the tension. Each of the bladders is individually pressurized by a pressurization system to define a support

configuration of the seat cushion. The pressurization system is disabled when tension in the safety harness has attained a threshold level.

Official Gazette of the U.S. Patent and Trademark Office

Cushions; Harnesses; Seats; Safety Devices

20080009745 NASA Marshall Space Flight Center, Huntsville, AL, USA

Friction Stir Weld Tools

Carter, Robert W., Inventor; Payton, Lewis N., Inventor; October 07, 2007; 8 pp.; In English; Original contains black and white illustrations; US-Patent-7,275,675; US-Patent-Appl-SN-10/928876; NASA-Case-MFS-31918-1; No Copyright;

Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009745>

A friction stir weld tool sleeve is supported by an underlying support pin. The pin material is preferably selected for toughness and fracture characteristics. The pin sleeve preferably has a geometry which employs the use of an interrupted thread, a plurality of flutes and/or eccentric path to provide greater flow through. Paddles have been found to assist in imparting friction and directing plastic metal during the welding process.

Official Gazette of the U.S. Patent and Trademark Office

Friction Stir Welding; Welding; Tools

20080010649 Minnesota Univ., Minneapolis, MN, USA

Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section

Simon, Terrence W.; Adolphson, David; May 2006; In English; See also 20060022139

Contract(s)/Grant(s): NAG3-2482; WBS 972-30-01

Report No.(s): NASA/CR-214131/SUPPL; E-15465/SUPPL; No Copyright; Avail.: CASI: [C01](#), CD-ROM

No abstract available

Engine Design; Stirling Engines; Test Chambers

20080010684 NASA Glenn Research Center, Cleveland, OH, USA

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life

Zaretsky, Erwin V.; Poplawski, Joseph V.; Root, Lawrence E.; January 2008; 25 pp.; In English; 2006 61st STLE Annual Meeting and Exhibition, 7-11 May 2006, Calgary, Alberta, Canada; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 561581.02.07.03.03.03

Report No.(s): NASA/TM-2008-214265; E-15551-1; Copyright; Avail.: CASI: [A03](#), Hardcopy

ANSI/ABMA and ISO standards based on Lundberg-Palmgren bearing life theory are normalized for ball bearings having inner- and outrace conformities of 52 percent (0.52) and made from pre-1940 bearing steel. The Lundberg-Palmgren theory incorporates an inverse 9th power relation between Hertz stress and fatigue life for ball bearings. The effect of race conformity on ball set life independent of race life is not incorporated into the Lundberg-Palmgren theory. In addition, post-1960 vacuum-processed bearing steel exhibits a 12th power relation between Hertz stress and life. The work reported extends the previous work of Zaretsky, Poplawski, and Root to calculate changes in bearing life--that includes the life of the ball set--caused by race conformity, Hertz stress-life exponent, ball bearing type and bearing series. The bearing fatigue life in actual application will usually be equal to or greater than that calculated using the ANSI/ABMA and ISO standards that incorporate the Lundberg-Palmgren theory. The relative fatigue life of an individual race is more sensitive to changes in race conformity for Hertz stress-life exponent n of 12 than where $n = 9$. However, when the effects are combined to predict actual bearing life for a specified set of conditions and bearing geometry, the predicted life of the bearing will be greater for a value of $n = 12$ than $n = 9$.

Author

Ball Bearings; Fatigue Life; Stress Measurement; Tribology; Accelerators

20080010690 NASA Glenn Research Center, Cleveland, OH, USA

Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage

Daniels, Christopher C.; Oswald, Jay J.; Bastrzyk, Marta B.; Smith, Ian; Dunlap, Patrick H., Jr.; Steinetz, Bruce M.; January 2008; 17 pp.; In English; AIAA Space 2007 Conference and Exposition, 18-20 Sep. 2007, Long Beach, CA; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNC04AA73A; WBS 644423.06.31.04.01.03.22

Report No.(s): NASA/TM-2008-215023; AIAA Paper 2007-6197; E-16227; Copyright; Avail.: CASI: [A03](#), Hardcopy

A universal docking and berthing system is being developed by the National Aeronautics and Space Administration

(NASA) to support all future space exploration missions to low-Earth orbit (LEO), to the Moon, and to Mars. An investigation of the compression set of two seals mated in a seal-on-seal configuration and the force required to separate the two seals after periods of mating was conducted. The leakage rates of seals made from two silicone elastomer compounds, S0383-70 and S0899-50, configured in seal-on-seal mating were quantified. The test specimens were sub-scale seals with representative cross-sections and a 12 inch outside diameter. The leakage rate of the seals manufactured from S0899-50 was higher than that of the seals made from S0383-70 by a factor of 1.8. Similarly, the adhesion of the 50 durometer elastomer was significantly higher than that of the 70 durometer compound. However, the compression set values of the S0899-50 material were observed to be significantly lower than those for the S0383-70.

Author

Docking; Elastomers; Space Exploration; Low Earth Orbits; Bonding

38

QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, quality control, inspection, maintainability, and standardization.

20080009636 General Electric Co., Schenectady, NY USA

Method and apparatus for in-situ detection and isolation of aircraft engine faults

Bonanni, Pierino Gianni, Inventor; Brunell, Brent Jerome, Inventor; October 9, 2007; 14 pp.; In English

Contract(s)/Grant(s): NAS3-01135

Patent Info.: Filed December 29, 2004; US-Patent-7,280,941; US-Patent-Appl-SN-11/025,145; No Copyright; Avail.:

CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009636>

A method for performing a fault estimation based on residuals of detected signals includes determining an operating regime based on a plurality of parameters, extracting predetermined noise standard deviations of the residuals corresponding to the operating regime and scaling the residuals, calculating a magnitude of a measurement vector of the scaled residuals and comparing the magnitude to a decision threshold value, extracting an average, or mean direction and a fault level mapping for each of a plurality of fault types, based on the operating regime, calculating a projection of the measurement vector onto the average direction of each of the plurality of fault types, determining a fault type based on which projection is maximum, and mapping the projection to a continuous-valued fault level using a lookup table.

Official Gazette of the U.S. Patent and Trademark Office

In Situ Measurement; Fault Detection; Aircraft Engines; Engine Design

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*.

20080009622 Michigan Univ., Ann Arbor, MI USA

Thermal modulation for gas chromatography

Hasselbrink, Ernest F., Inventor; Libardoni, Mark, Inventor; Stewart, Kristine, Inventor; Waite, J. Hunter, Inventor; Block, Bruce P., Inventor; Sacks, Richard D., Inventor; November 13, 2007; 17 pp.; In English

Contract(s)/Grant(s): NAG5-12171

Patent Info.: Filed May 23, 2005; US-Patent-7,293,449; US-Patent-Appl-SN-11/134,873; No Copyright; Avail.:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009622>

A thermal modulator device for gas chromatography and associated methods. The thermal modulator device includes a recirculating fluid cooling member, an electrically conductive capillary in direct thermal contact with the cooling member, and a power supply electrically coupled to the capillary and operable for controlled resistive heating of the capillary. The capillary can include more than one separate thermally modulated sections.

Official Gazette of the U.S. Patent and Trademark Office

Gas Chromatography; Temperature Control; Modulators

20080009852 Air Force Academy, Colorado Springs, CO USA

Environmental Assessment Golf Learning Center and Driving Range

Normandie, Richard W; Lewis, Matthew R; Oct 7, 2007; 55 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475325; EA-06-002; XC-10 CES/CEV; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475325>

The USA Air Force Academy (Academy) has prepared an Environmental Assessment (EA) to assess the potential environmental effects resulting from construction of a Golf Learning Center and driving range at the Academy Eisenhower Golf Course. The EA analyzes the potential environmental impacts from proposed activities on air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste management, land use, noise and water resources. The EA also analyzed environmental justice and cumulative impacts of the Proposed Action. The Academy has determined that the impacts to these resources would not be significant.

DTIC

Armed Forces (United States); Construction; Environmental Surveys

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*.

20080009601 NASA Johnson Space Center, Houston, TX, USA

Genesis Concentrator Target Particle Contamination Mapping and Material Identification

Calaway, Michael J.; Rodriquez, M. C.; Allton, J. H.; March 10, 2007; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 110-14 Mar. 2007, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The majority of surface particles were found to be < 5 microns in diameter with increasing numbers close to the optical resolution limit of 0.3 microns. Acceleration grid EDS results show that the majority of materials appear to be from the SRC shell and SLA materials which include carbon-carbon fibers and Si-rich microspheres in a possible silicone binder. Other major debris material from the SRC included white paint, kapton, collector array fragments, and Al. Image analysis also revealed that SRC materials were also found mixed with the Utah mud and salt deposits. The EDS analysis of the acceleration grid showed that particles < 1 μ m were generally carbon based particles. Chemical cleaning techniques with Xylene and HF in an ultrasonic bath are currently being investigated for removal of small particles by the Genesis science team as well as ultra-pure water megasonic cleaning by the JSC team [4]. Removal of organic contamination from target materials is also being investigated by the science team with the use of UV-ozone cleaning devices at JSC and Open University [5]. In preparation for solar wind oxygen analyses at UCLA and Open University [1, 2], surface particle contamination on three Genesis concentrator targets was closely examined to evaluate cleaning strategies. Two silicon carbide (Genesis sample # 60001 and 60003) and one chemical vapor deposited (CVD) 13C concentrator target (60002) were imaged and mosaic mapped with optical microscopes. The resulting full target mosaic images and particle feature maps were subsequently compared with non-flight, but flight-like, concentrator targets and sample return capsule (SRC) materials. Contamination found on the flown concentrator acceleration grid was further examined using a scanning electron microscope (SEM). Energy dispersive X-ray spectroscopy (EDS) for particle identification was subsequently compared with the optical images from the flown targets. Figure 1 show that all three targets imaged in this report are fully intact and do not show any signs of material fractures. However, previous ellipsometry results and overview imaging of both flown SiC targets show a solar wind irradiation gradient from the center focal point to the outer edge [3]. In addition, due to the hard landing, each target has experienced varying degrees of impacts, scratches, and particle debris from the spacecraft and Utah impact site.

Derived from text

Chemical Cleaning; Accumulators; Imaging Techniques; Scanning Electron Microscopy; Sample Return Missions; Vapor Deposition; X Ray Spectroscopy; Microparticles

20080009728 NASA Johnson Space Center, Houston, TX, USA

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses

Danielson, L. R.; Righter, K.; Sutton, S.; Newville, M.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): DE-AC02-06CH11357; NSF EAR-0622171; DE-FG02-94ER14466; Copyright; Avail.: CASI: [A01](#), Hardcopy

Tungsten is important in constraining core formation of the Earth because this element is a moderately siderophile element (depleted ~ 10 relative to chondrites) and, as a member of the Hf-W isotopic system, it is useful in constraining the timing of core formation. A number of previous experimental studies have been carried out to determine the silicate solubility and metal-silicate partitioning behavior of W, including its concomitant oxidation state. However, results of previous studies are inconsistent on whether W occurs as W(4+) or W(6+). It is assumed that W(4+) is the cation valence relevant to core formation. Given the sensitivity to silicate composition of high valence cations, knowledge of the oxidation state of W over a wide range of fO₂ is critical to understanding the oxidation state of the mantle and core formation processes. This study seeks to measure the W valence and change in valence state over the range of fO₂ most relevant to core formation, around IW-2. Derived from text

Iron; Silicates; Tungsten; Earth Core; Silica Glass; Oxidation; Mineralogy

20080009759 NASA Johnson Space Center, Houston, TX, USA

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation

Acuff, K. M.; Danielson, L.; Righter, K.; Lee, C. T.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

There are several hypotheses on the specific processes that might have occurred during the formation of the Earth. One hypothesis that has been proposed is that early in the Earth's formation, there was a magma ocean present, and within this body, siderophile elements separated out of the silicate liquid to form the metal core. This study addresses this hypothesis. P and Mo are moderately siderophile elements that are present in both the mantle and the core. The concentrations of P and Mo in silicate vs. metal can be measured and in turn used to determine the temperatures, pressures, oxygen fugacity and melt composition required to achieve the same concentrations as observed in the mantle. The data here include eight experiments examining the partitioning of P and Mo between metallic liquid and silicate liquid. The purpose of the experiments has been to gain a greater understanding of core-mantle separation during the Earth formation process and examines temperature effect on P and Mo, which has not been systematically studied before.

Author

Earth (Planet); Earth Mantle; Magma; Molybdenum; Phosphorus; Silicates; Geochemistry; Geochronology

20080010135 NASA Langley Research Center, Hampton, VA, USA

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data

Liu, Xu; Zhou, Daniel K.; Larar, Allen; Smith, William L.; Mango, Stephen A.; Quarterly Journal of the Royal Meteorological Society; December 06, 2007; 133, S3, pp. 243-256; In English; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

ONLINE: <http://dx.doi.org/10.1002/qj.156>

The objective of the paper is to apply a novel radiative transfer model and a physical retrieval algorithm to hyperspectral data taken during the European Aqua Atmospheric Thermodynamics Experiment (EAQUATE) campaign. A principal-component-based radiative transfer model (PCRTM) is used to calculate projection coefficients of the radiance spectrum onto a set of predefined empirical orthogonal functions (EOFs) and associated derivatives with respect to the state vector. Instead of fitting channel radiances, the physical retrieval algorithm iteratively fits the principal component (PC) scores or the EOF projection coefficients of the observed radiance spectrum using the PCRTM as its forward model. Since the EOFs are orthonormal to each other, only a few PC scores are needed to capture the information content of the radiance spectrum, therefore reducing the computational time needed for running both the forward model and the inversion. This paper demonstrates the application of such a physical algorithm for retrieving atmospheric temperature, moisture and ozone profiles, and surface properties such as surface skin temperature and surface emissivity. The results have been compared with those obtained with a NAST-I channel-based physical retrieval algorithm and with those obtained from collocated radiosonde and LIDAR measurements.

Author

Radiative Transfer; Atmospheric Temperature; Orthogonal Functions; Radiance; Surface Properties; Surface Temperature

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*.

20080009613 NASA Johnson Space Center, Houston, TX, USA

The Crew Earth Observations Experiment: Earth System Science from the ISS

Stefanov, William L.; Evans, Cynthia A.; Robinson, Julie A.; Wilkinson, M. Justin; May 26, 2007; 23 pp.; In English; International Space Development Conference, 26 May 2007, Addison, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009613>

This viewgraph presentation reviews the use of Astronaut Photography (AP) as taken from the International Space Station (ISS) in Earth System Science (ESS). Included are slides showing basic remote sensing theory, data characteristics of astronaut photography, astronaut training and operations, crew Earth observations group, targeting sites and acquisition, cataloging and database, analysis and applications for ESS, image analysis of particular interest urban areas, megafans, deltas, coral reefs. There are examples of the photographs and the analysis.

CASI

Earth Sciences; Image Analysis; International Space Station; Photography; Remote Sensing; Image Classification; Satellite-Borne Photography

20080009883 Alaska Univ., Fairbanks, AK USA

New Methods for Detection of Fish Populations or Mapping of Fish Habitat

Brown, Evelyn D; Jan 2006; 4 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0653

Report No.(s): AD-A475422; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475422>

The overall objective of this work is to develop and test a new technique to detect and map epipelagic fishes and their habitat in the EEZ of Oregon and Washington. The technique combines data from satellites, aircraft, ships, and moorings. Each platform covers a unique set of spatial and temporal scales, and each instrument has its own advantages and disadvantages. A technique combining data from multiple platforms can be much more powerful than any one alone. The secondary objective is the analyze the array of spatial data collected to better understand the connection and affects of habitat and fish behavior on fish detection and distribution.

DTIC

Fishes; Habitats; Mapping; Mooring; Optical Radar; Populations; Rangefinding

20080009970 Massachusetts Inst. of Tech., Cambridge, MA USA

Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle

Warren, Jessica M; Sep 2007; 284 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): OCE-0526905; OCE-0624408

Report No.(s): AD-A475538; MIT/WHOI-2007-23; No Copyright; Avail.: Defense Technical Information Center (DTIC)

I provide constraints on mantle convection through observations of the rheology and composition of the oceanic upper mantle. Convection cannot be directly observed, yet is a fundamental part of the plate tectonic cycle. Relative motion among plates is accommodated by localized deformation at their boundaries. I demonstrate that in the ductile regime, strain localization occurs when different mineral phases are mixed together, limiting grain annealing. Upper mantle flow is by dislocation creep, resulting in seismic anisotropy due to mineral alignment. I use a shear zone in the Josephine Peridotite to quantify the relationship between mineral orientation and shear strain, providing an improved framework for the interpretation of seismic anisotropy. The upper mantle is generally assumed to be homogeneous in composition. From detailed isotopic and chemical analyses of abyssal peridotites from the Southwest Indian Ridge, I show that the mantle is heterogeneous at a range of length-scales. Abyssal peridotites recovered at ocean ridges are generally interpreted as the depleted residues of melt extraction. I find that melt-rock reaction is a significant part of the melt extraction process, modifying the composition of the

lithospheric mantle. The generation of heterogeneous lithosphere provides a source for asthenospheric heterogeneity, via subduction and mantle convection.

DTIC

Earth Mantle; Geochemistry; Oceans; Rheology

20080009990 Woods Hole Oceanographic Inst., MA USA

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments

Williams, Clare M; Sep 2007; 257 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): OCE-9819261; OCE-0118445

Report No.(s): AD-A475578; MIT/WHOI-2007-21; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The origin of symmetric alternating magnetic polarity stripes on the seafloor is investigated along East Pacific Rise (EPR) (9 degrees 25' -9 degrees 55'N) and Kane Megamullion (KMM) (23 degrees 40'N) in the Atlantic. At the EPR, along-axis variations in the axial magnetic anomaly result from changing source layer thickness, consistent with observed changes in seismic Layer 2a. The extrusive basalts therefore constitute the magnetic source layer along the ridge axis and long term crustal accretion patterns are reflected in the axial anomaly appearance. At KMM the C2r.2r/C2An.1n (approx. 2.581 Ma) polarity reversal boundary is recorded by lower crust (gabbro) and upper mantle (serpentinized peridotites) rocks exposed on the seafloor by detachment faulting. Both lithologies have stable remanent magnetization, capable of contributing to the magnetic source layer. The geometry of the polarity boundary in the northern KMM region, interpreted to be a gabbro pluton, dips away from the ridge axis and is consistent with a rotated conductively cooled isotherm. In the central region the boundary in the serpentinized peridotites dips towards the ridge axis and is thought to represent an alteration front. The linear appearance of the polarity boundary across the two regions suggests that both lithologies acquired their remanence at approximately the same time.

DTIC

Crusts; Geomagnetism; Lithosphere; Magnetization; Mid-Ocean Ridges; Ocean Bottom; Oceans; Tectonics

20080010011 Oregon State Univ., Corvallis, OR USA

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat

Benoit-Bird, Kelly J; Jan 2006; 6 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0669

Report No.(s): AD-A475653; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The ultimate goal of this research project is to substantially improve scientists' understanding of the relation between ecologically important key fish species (e.g., sardine and albacore) and the physical environment by collecting synoptic measurements with improved spatial and temporal resolution of observations. The author's partnership program is striving to develop a new method for detecting fish and synoptically mapping their environment at nested spatial and temporal scales. This new technique involves employing aerial data collection techniques (which are able to collect data at a much larger range of temporal and spatial scales than traditional methods) and coupling them with directed and coordinated ship-based observations, buoy data, and satellite-derived information. The nested array of observations are being analyzed and modeled in a Geographical Information System-based environment to provide qualitative and quantitative views of habitat- and behavior-induced fish distribution patterns.

DTIC

Biological Effects; Data Acquisition; Detection; Fishes; Habitats; Mapping; Multisensor Fusion; Populations

20080010873 NASA Marshall Space Flight Center, Huntsville, AL, USA

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval

Boccippio, Dennis J.; Petersen, Walter A.; Cecil, Daniel; April 24, 2006; 1 pp.; In English; 27th Conference on Hurricanes and Tropical Meteorology, 24-28 Apr. 2006, Monterey, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Robust description of the diurnal cycle from TRMM observations is complicated by the limitations of Low Earth Orbit (LEO) sampling; from a 'climatological' perspective, sufficient sampling must exist to control for both spatial and seasonal variability, before tackling an additional diurnal component (e.g., with 8 additional 3-hourly or 24 1-hourly bins). For documentation of vertical structure, the narrow sample swath of the TRMM Precipitation Radar limits the resolution of any of these components. A neural-network based 'virtual radar' retrieval has been trained and internally validated, using multifrequency / multipolarization passive microwave(TM1) brightness temperatures and textures parameters and lightning

(LIS) observations, as inputs, and PR volumetric reflectivity as targets (outputs). By training the algorithms (essentially highly multivariate, nonlinear regressions) on a very large sample of high-quality co-located data from the center of the TRMM swath, 3D radar reflectivity and derived parameters (VIL, IWC, Echo Tops, etc.) can be retrieved across the entire TMI swath, good to 8-9% over the dynamic range of parameters. As a step in the retrieval (and as an output of the process), each TMI multifrequency pixel (at 85 GHz resolution) is classified into one of the 25 archetypal radar profile vertical structure 'types', previously identified using cluster analysis. The dynamic range of retrieved vertical structure appears to have higher fidelity than the current (Version 6) experimental GPROF hydrometeor vertical structure retrievals. This is attributable to correct representation of the prior probabilities of vertical structure variability in the neural network training data, unlike the GPROF cloud-resolving model training dataset used in the V6 algorithms. The LIS lightning inputs are supplementary inputs, and a separate offline neural network has been trained to impute (predict) LIS lightning from passive-microwave-only data. The virtual radar retrieval is thus, in principle, extensible to Aqua/AMSR-E and NPOESS/CMIS passive microwave instruments. The virtual radar approach yields a threefold increase in effective sampling from the mission, albeit of lower-quality 'retrieved' data, reducing the variance of local estimates by one third (or the standard deviation by-0.57). In this talk, the variance reduction is leveraged to more finely resolve global diurnal variability in both space and time (local hour).

Author

Diurnal Variations; Lightning; Neural Nets; Vertical Distribution; Sampling; Remote Sensing

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*.

20080009634 California Inst. of Tech., Pasadena, CA USA

Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells

Narayanan, Sekharipuram R., Inventor; Yen, Shiao-Pin S., Inventor; October 16, 2007; 12 pp.; In English

Contract(s)/Grant(s): NAS7-1407

Patent Info.: Filed November 24, 2003; US-Patent-7,282,291; US-Patent-Appl-SN-10/722,352; No Copyright; Avail.:

CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009634>

Disclosed are methods for forming a water-free electrolyte membrane useful in fuel cells. Also provided is a water-free electrolyte membrane comprising a quaternized amine salt including poly-4-vinylpyridinebisulfate, a poly-4-vinylpyridinebisulfate silica composite, and a combination thereof and a fuel cell comprising the membrane.

Official Gazette of the U.S. Patent and Trademark Office

Electrolytes; Fuel Cells; Membranes; Protons; Electrochemical Synthesis

45

ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20080009643 NASA, Washington, DC USA

Removal of PCB and other halogenated organic contaminants found in ex situ structures

Quinn, Jacqueline, Inventor; Clausen, Christian, Inventor; Geiger, Cherie L., Inventor; Coon, Christina, Inventor; Berger, Cristina M., Inventor; Filipek, Laura B., Inventor; Milum, Kristen M., Inventor; September 18, 2007; 6 pp.; In English

Patent Info.: Filed October 27, 2004; US-Patent-7,271,199; US-Patent-Appl-SN-10/977,622; No Copyright; Avail.:

CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009643>

Emulsified systems of a surfactant-stabilized, biodegradable water-in-solvent emulsion with bimetallic particles contained with the emulsion droplets are useful at removing PCBs from ex situ structures. The hydrophobic emulsion system draws PCBs through the solvent/surfactant membrane. Once inside the membrane, the PCBs diffuse into the bimetallic particles and

undergo degradation. The PCBs continue to enter, diffuse, degrade, and biphenyl will exit the particle maintaining a concentration gradient across the membrane and maintaining a driving force of the reaction.

Official Gazette of the U.S. Patent and Trademark Office

Polychlorinated Biphenyls; Contaminants; Emulsions; Decontamination

46

GEOPHYSICS

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*.

20080009608 NASA Johnson Space Center, Houston, TX, USA

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262

Dalton, H. A.; Peslier, A. H.; Brandon, A. D.; Lee, C.-T. A.; Lapen, T. J.; [2008]; 2 pp.; In English; 39th Annual Lunar Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

RBT04262 was found by the 2004-2005 ANSMET team at the Roberts Massif in Antarctica. It is paired with RBT04261 and is classified as an olivine-phyric shergottite. RBT04261 is 4.0 x 3.5 x 2.5 cm and 78.8 g, and RBT04262 is 6.5 x 5.5 x 3.5 cm and 204.6 g. Both were partially covered by a fusion crust [1]. Chemical analysis and mapping of this meteorite was performed using the Cameca SX100 electron microprobe at NASA Johnson Space Center.

Derived from text

Meteorites; Petrology; Shergottites; Olivine; Minerals; Chemical Analysis

20080009712 NASA Johnson Space Center, Houston, TX, USA

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results

Treiman, A. H.; Morris, R. V.; Kring, D. A.; Mittlefehldt, D. W.; Jones, J. H.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

GRA 06128 & 06129 are paired achondrites [1], with unique mineral proportions (75% oligoclase), mineral compositions, and oxygen isotope ratios. They appear to represent alkalic igneous rock from a hitherto unsampled differentiated parent body, modified significantly by thermal and shock metamorphism. Samples and Methods: Bulk samples were examined at JSC during splitting for consortium analyses. Microscope and BSE images here are on thick section GRA06128,40. Chemical analyses of minerals were acquired at Johnson Space Center with the Cameca SX100, operated at 15 kV. Feldspar was analyzed with a defocused 5 micron beam @ 5 nA; other minerals were analyzed with a focused beam @ 20 nA. Moessbauer spectra were obtained at ARES, JSC [2]. Intrinsic radioactivity was measured in the low-level counting facility at ARES JSC [3]. An estimated abundance of Al-26 of approx. 70 dpm/kg is within the range determined for eucrites.

Derived from text

Aluminum Isotopes; Achondrites; Chemical Analysis; Petrography; Oxygen Isotopes; Igneous Rocks; Metamorphism (Geology); Minerals

20080009713 NASA Johnson Space Center, Houston, TX, USA

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars

Schroder, C.; Arvidson, R. E.; Schmidt, M. E.; Gellert, R.; Klingelhofer, G.; Ming, D. W.; Morris, R. V.; Rice, J. W.; Yen, A. S.; deSouza, P. A., Jr.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains poor quality, truncated or crooked pages; Copyright; Avail.: CASI: [A01](#), Hardcopy

The investigation of Home Plate and its surroundings in the Inner Basin of the Columbia Hills in Gusev Crater has added substantially to the water story on Mars. Textural, morphological, and geochemical evidence from Home Plate point towards an explosive origin, probably a hydrovolcanic explosion [1]. High silica deposits in the immediate vicinity of Home Plate suggest hydrothermal alteration [e.g. 2,3]. Pervasively altered deposits rich in hematite were investigated to the southeast of Home Plate. Of these, the target Halley, the target KingGeorgelsland on the GrahamLand outcrop, and the targets Montalva and Riquelme on the Troll outcrop were investigated in situ with the Alpha Particle X-ray spectrometer (APXS), the Microscopic Imager (MI), and the Moessbauer (MB) spectrometer (Fig. 1).

Derived from text

Mars Craters; Geochemistry; Explosions; Hematite; Morphology; Halley's Comet; Mars Surface

20080009940 Defence Research Board, Ottawa, Ontario Canada

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor

Stovas, M V; Nov 1963; 22 pp.; In English

Report No.(s): AD-A475451; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Though the idea has not been much discussed for the last fifty years, variation in the rotation of the earth must be accompanied by change of the earth's equatorial and polar radii, change of meridian arc length, change of radius of curvature and change of areal relationships on the earth's surface.

DTIC

Earth Crust; Earth Rotation; Earth Tides; Geomorphology; Structural Properties (Geology); Tectonics

20080010692 NASA Johnson Space Center, Houston, TX, USA

K/Th in Achondrites and Interpretation of Grand Data for the Dawn Mission

Usui, T.; McSween, H. Y., Jr.; Mittlefehldt, D. W.; Prettyman, T. H.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.:

CASI: [A01](#), Hardcopy

The Dawn mission will explore 4 Vesta [1], a highly differentiated asteroid believed to be the parent body of the howardite, eucrite and diogenite (HED) meteorite suite [e.g. 2]. The Dawn spacecraft is equipped with a gamma-ray and neutron detector (GRaND), which will enable measurement and mapping of elemental abundances on Vesta's surface [3]. Drawing on HED geochemistry, Usui and McSween [4] proposed a linear mixing model for interpretation of GRaND data. However, the HED suite is not the only achondrite suite representing asteroidal basaltic crusts; others include the mesosiderites, angrites, NWA 011, and possibly Ibitira, each of which is thought to have a distinct parental asteroid [5]. Here we critically examine the variability of GRaND-analyzed elements, K and Th, in HED meteorites, and propose a method based on the K-Th systematics to distinguish between HED and the other differentiated achondrites. Maps of these elements might also recognize incompatible element enriched areas such as mapped locally on the Moon (KREEP) [6], and variations in K/Th ratios might indicate impact volatilization of K. We also propose a new mixing model using elements that will be most reliably measured by GRaND, including K.

Author

Achondrites; Meteoritic Composition; Vesta Asteroid; Geochemistry; Crusts

20080010778 NASA Johnson Space Center, Houston, TX, USA

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine

Herrin, J. S.; Lee, C-T. A.; Mittlefehldt, D. W.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: [A01](#),

Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010778>

Ureilites are ultramafic achondrites composed primarily of coarse-grained low-Ca pyroxene and olivine with interstitial carbonaceous material, but a number of them contain augite [1]. Ureilites are considered to be restites after partial melting of a chondritic precursor, although at least some augite-bearing ureilites may be partially cumulate [1, 2]. In this scenario, the augite is a cumulus phase derived from a melt that infiltrated a restite composed of typical ureilite material (olivine+low-Ca pyroxene) [2]. To test this hypothesis, we examined the major and trace element compositions of silicate minerals in select augite-bearing ureilites with differing mg#. Polished thick sections of the augite-bearing ureilites ALH 84136, EET 87511, EET 96293, LEW 88201, and META78008 and augite-free typical ureilite EET 90019 were examined by EPMA for major and minor elements and laser ablation ICP-MS (LA-ICP-MS) for trace elements, REE in particular. Although EET 87511 is reported to contain augite, the polished section that we obtained did not.

Author

Chondrites; Carbonaceous Materials; Ureilites; Trace Elements; Mineralogy; Olivine; Achondrites

20080010782 NASA Johnson Space Center, Houston, TX, USA

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite MIL03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers

Morris, R. V.; McKay, G. A.; Agresti, D. G.; Li, Loan; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#),

Hardcopy

Martian meteorite MIL03346 is described as an augite-rich cumulate rock with approx.80%, approx.3%, and approx.21%

modal phase proportions of augite (CPX), olivine and glassy mesostasis, respectively, and is classified as a nakhlite [1]. The Mossbauer spectrum for whole rock (WR) MIL 03346 is unusual for Martian meteorites in that it has a distinct magnetite subspectrum (~7% subspectral area) [2]. The meteorite also has products of pre-terrestrial aqueous alteration ('iddingsite') that is associated primarily with the basaltic glass and olivine. The Mossbauer spectrometers on the Mars Exploration Rovers have measured the Fe oxidation state and the Fe mineralogical composition of rocks and soils on the planet's surface since their landing in Gusev Crater and Meridiani Planum in January, 2004 [3,4]. The MIL 03346 meteorite provides an opportunity to 'ground truth' or refine Fe phase identifications. This is particularly the case for the so-called 'nanophase ferric oxide' (npOx) component. npOx is a generic name for a ferric rich product of oxidative alteration. On Earth, where we can take samples apart and study individual phases, examples of npOx include ferrihydrite, schwertmannite, akaganéite, and superparamagnetic (small particle) goethite and hematite. It is also possible for ferric iron to be associated to some unknown extent with igneous phases like pyroxene. We report here an electron microprobe (EMPA) and Moessbauer (MB) study of density separates of MIL 03346. The same separates were used for isotopic studies by [5]. Experimental techniques are described by [6,7].

Author

Mossbauer Effect; Nakhlites; Mars Exploration; Roving Vehicles; SNC Meteorites; Basalt; Olivine; Mars Craters; Hematite; Mineralogy

20080010785 NASA Johnson Space Center, Houston, TX, USA

The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt

Morris, R. V.; Ming, D. W.; Gellert, R.; Yen, A.; Clark, B. C.; Gnaff, T. G.; Arvidson, R. E.; Squyres, S. W.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Alpha Particle X-ray Spectrometer (APXS) instrument on the Mars Exploration Rover (MER) Spirit measured three targets on or adjacent to Home Plate in Gusev Crater that have unusually high SiO₂ concentrations (68% to 91%), unusually low FeO concentrations (1% to 7%, with total Fe as FeO), and unusually high TiO₂/FeO ratios (0.2 to 1.2 by weight) [1]. Two targets (Kenosha Comets and Lefty Ganote) are located on high albedo soil (Gertrude Weise) that was exposed by the rover wheels, and one target is a float rock called Fuzzy Smith. Kenosha Comets has the highest SiO₂ concentration, lowest FeO concentration, and highest TiO₂/FeO ratio. Mineralogical evidence from the MER Miniature Thermal Emission Spectrometer (Mini-TES) suggests that the SiO₂ is present as amorphous (noncrystalline) SiO₂ at Gertrude Weise and nearby targets [2,3]. Mini-TES data were not acquired for Fuzzy Smith. Home Plate is considered to have an explosive volcanic origin, resulting when basaltic magma came into contact with ground water or ice [4]. Within ~50 m to 1 km of Home Plate are sulfate rich soil deposits (Paso Robles class soils with 22-35% SO₃) which are considered to be probable fumarolic and/or hydrothermal deposits associated with the volcanism [5]. We develop the model here, suggested by [5], that the high-silica materials are another manifestation of acid-sulfate processes associated with fumarolic and hydrothermal activity at Home Plate. This is done by analogy with basaltic materials altered by acid sulfate processes on the Island of Hawaii.

Author

Hydrothermal Systems; Amorphous Materials; Basalt; Cratering; Alpha Particles; Thermal Emission; Mars Exploration; Mineralogy; X Ray Spectrometers

20080010812 NASA Johnson Space Center, Houston, TX, USA

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate

Ming, D. W.; Gellert, R.; Morris, R. V.; Yen, A. S.; Arvidson, E.; Brueckner, J.; Clark, B. C.; Cohen, B. A.; Fleischer, I.; Klingelhofer, G.; McCoy, T. J.; Mittlefehldt, D. W.; Schmidt, M. E.; Schroeder, C.; Squyres, S. W.; Zipfel, J.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Mars Exploration Rover Spirit landed in Gusev crater on Jan. 4, 2004. Spirit has traversed the Gusev crater plains, ascended to the top of Husband Hill, and entered into the Inner Basin of the Columbia Hills. The Athena science payload onboard Spirit has recorded numerous measurements on the chemistry and mineralogy of materials encountered during nearly 2 Mars years of operation within the crater. Rocks and soils have been grouped into classes based upon their unique differences in mineralogy and chemistry [1-3]. Some of the most significant chemical discoveries include the composition of Adirondack class flood basalts [4-6]; high sulfur in Clovis and Peace Class rocks [7,2]; high P and Ti in Wishstone Class rocks [7,2]; composition of alkalic basalts [2,6]; very high S in Paso Robles class soils [7,2], and the possible occurrence of a smectite-like

chemical composition in Independence class rocks [8]. Water has played a significant role in the alteration of rocks and soils in the Columbia Hills. The occurrence of goethite and ferric sulfate alone suggests that liquid water was involved in their formation [3]. The pervasively altered materials in Husband Hill outcrops and rocks may have formed by the aqueous alteration of basaltic rocks, volcanoclastic materials, and/or impact ejecta by solutions that were rich in acid-volatile elements [2]. The objective of this paper is to provide an update on the health of the Alpha Particle X-ray Spectrometer (APXS) and to expand the geochemical dataset from sol 470 to sol 1368. Specific objectives are to (1) update the rock and soil classifications, (2) characterize elemental relationships among the major rock and soil classes, and (3) evaluate the involvement of water in the formation or alteration of the materials in these classes.

Author

Craters; Mars Exploration; Iron Oxides; Chemical Composition; Alpha Particles; Mineralogy; Geochemistry; Soils

20080010813 NASA Johnson Space Center, Houston, TX, USA

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid

Mittlefehldt, David W.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010813>

There are numerous types of differentiated meteorites, but most represent either the crusts or cores of their parent asteroids. Ureilites, olivine-pyroxene-graphite rocks, are exceptions; they are mantle restites [1]. Dunite is expected to be a common mantle lithology in differentiated asteroids. In particular, models of the eucrite parent asteroid contain large volumes of dunite mantle [2-4]. Yet dunites are very rare among meteorites, and none are known associated with the howardite, eucrite, diogenite (HED) suite. Spectroscopic measurements of 4 Vesta, the probable HED parent asteroid, show one region with an olivine signature [5] although the surface is dominated by basaltic and orthopyroxenitic material equated with eucrites and diogenites [6]. One might expect that a small number of dunitic or olivine-rich meteorites might be delivered along with the HED suite. The 46 gram meteoritic dunite MIL 03443 (Fig. 1) was recovered from the Miller Range ice field of Antarctica. This meteorite was tentatively classified as a mesosiderite because large, dunitic clasts are found in this type of meteorite, but it was noted that MIL 03443 could represent a dunite sample of the HED suite [7]. Here I will present a preliminary petrologic study of two thin sections of this meteorite.

Author

Dunite; Meteoritic Composition; Basalt; Vesta Asteroid; Ureilites; Crusts; Breccia

20080010815 NASA Johnson Space Center, Houston, TX, USA

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths

Fleischer, I.; Klingelhofer, G.; Morris, R. V.; Schroder, C.; Rodionov, D.; deSouza, P.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The miniaturized Moessbauer (MB) spectrometers MIMOS II [1] on board of the two Mars Exploration Rovers Spirit and Opportunity have obtained more than 600 spectra of more than 300 different rock and soil targets [2-7]. Both instruments have simultaneously collected 6.4 keV X-ray and 14.4 keV γ -ray spectra in backscattering geometry [1]. With Spirit's MB spectrometer, 6.4 keV and 14.4 keV spectra have been obtained for all targets through sol 461. After this date, only 14.4 keV spectra were collected. With Opportunity's spectrometer, 6.4 keV and 14.4 keV spectra have been collected for all targets to date. The Fe-mineralogy of rock and soil targets at both landing sites reported to date has been exclusively extracted from 14.4 keV spectra [2-5]. The comparison of 6.4 keV and 14.4 keV spectra provides depth selective information about a sample, but interpretation is not always straightforward [8].

Derived from text

Mossbauer Effect; X Ray Spectra; Penetration; Soils; Mars Surface; Mineralogy; Miniaturization; Depth

20080010886 NASA Johnson Space Center, Houston, TX, USA

Acid Vapor Weathering of Apatite and Implications for Mars

Hausrath, E. M.; Golden, D. C.; Morris, R. V.; Ming, D. W.; [2008]; 2 pp.; In English; 39th Lunar Planetary Science

Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Phosphorus is an essential nutrient for terrestrial life, and therefore may be important in characterizing habitability on Mars. In addition, phosphate mobility on Mars has been postulated as an indicator of early aqueous activity [1]. Rock surfaces analyzed by the Spirit Mars Exploration Rover indicate elemental concentrations consistent with the loss of a phosphate-containing mineral [2], and the highly altered Paso Robles deposit contains ~5% P₂O₅, modeled as 8-10 % phosphate [3]. Depending on the pH of the solution, phosphate can exist as one of four charge states, which can affect its solubility, reactivity and mobility. Phosphate may therefore prove a useful and interesting tracer of alteration conditions on Mars. Acid vapor weathering has been previously studied as a potentially important process on Mars [4-6], and Paso Robles may have been formed by reaction of volcanic vapors with phosphate-bearing rock [3, 7]. Here we present preliminary results of acid vapor reactions in a Parr vessel [6] using fluorapatite, olivine and glass as single phases and in a mixture.

Author

Phosphorus; Mars Environment; Mars Exploration; Calcium Phosphates; Rocks; Weathering; Minerals; Habitability; Olivine

47

METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20080009656 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water

delaTorreJuarez, Manuel; Schroder, T. M.; Ao, Chi O.; Herman, Robert L.; December 13, 2004; 12 pp.; In English; The American Geophysical Union (AGU) Fall Meeting, 13-17 Dec. 2004, San Francisco, CA, USA; Original contains black and white illustrations

Report No.(s): AGU A11-003; Copyright; Avail.: Other Sources

ONLINE: <http://hdl.handle.net/2014/40607>

This document describes the annual cycle of the trajectory track line (TTL) fine scale thermal structure as captured by global positioning system (GPS) radio occultation and the pressure levels of the East Meets West Foundation (EMWF) weather analysis. This annual cycle is compared to the annual cycle in water concentrations measured by the HALogen Occultation Experiment (HALOE). A comparison between saturation mixing ratios at the temperatures captured by GPS radio occultation and HALOE concentrations of water vapor shows an annual cycle that is dominated by supersaturation in the boreal winter months, when the upward mass fluxes are larger, and subsaturation in the summer. The longitudinal dependence of these cycles is discussed as well as the possible implications for the seasonality of stratospheric-tropospheric exchanges of water.

Derived from text

Annual Variations; Temperature Distribution; Halogen Occultation Experiment; Trajectories; Precipitation (Meteorology)

20080009758 NASA Langley Research Center, Hampton, VA, USA

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors

Priestley, K. J.; Matthews, G.; Thomas, S.; July 24, 2006; 2 pp.; In English; 2006 Western Pacific Geophysics Meeting, 24-27 Jul. 2006, Beijing, China

Contract(s)/Grant(s): WBS 921266.04.07.07

Report No.(s): Paper No. A45A-06; Copyright; Avail.: Other Sources; Abstract Only

The CERES Flight Models 1 through 4 instruments were launched aboard NASA's Earth Observing System (EOS) Terra and Aqua Spacecraft into 705 Km sun-synchronous orbits with 10:30 a.m. and 1:30 p.m. equatorial crossing times. These instruments supplement measurements made by the CERES Proto Flight Model (PFM) instrument launched aboard NASA's Tropical Rainfall Measuring Mission (TRMM) into a 350 Km, 38-degree mid-inclined orbit. CERES Climate Data Records consist of geolocated and calibrated instantaneous filtered and unfiltered radiances through temporally and spatially averaged TOA, Surface and Atmospheric fluxes. CERES filtered radiance measurements cover three spectral bands including shortwave (0.3 to 5 microns), total (0.3 to 100 microns) and an atmospheric window channel (8 to 12 microns). The CERES Earth Radiation Budget measurements represent a new era in radiation climate data, realizing a factor of 2 to 4 improvement in calibration accuracy and stability over the previous ERBE climate records, while striving for the next goal of 0.3-percent per decade absolute stability. The current improvement is derived from two sources: the incorporation of lessons learned from the ERBE mission in the design of the CERES instruments and the development of a rigorous and comprehensive radiometric

validation protocol consisting of individual studies covering different spatial, spectral and temporal time scales on data collected both pre and post launch. Once this ensemble of individual perspectives is collected and organized, a cohesive and highly rigorous picture of the overall end-to-end performance of the CERES instrument's and data processing algorithms may be clearly established. This approach has resulted in unprecedented levels of accuracy for radiation budget instruments and data products with calibration stability of better than 0.2-percent and calibration traceability from ground to flight of 0.25-percent. The current work summarizes the development, philosophy and implementation of the protocol designed to rigorously quantify the quality of the data products as well as the level of agreement between the CERES TRMM, Terra and Aqua climate data records.

Author

Earth Radiation Budget; Atmospheric Radiation; Flight Instruments; Climate; Data Processing; Radiometers; Energy Budgets

20080009858 Miami Univ., Miami, FL USA

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones

Grabner, Hans C; Donelan, Mark A; Brown, Michael G; Slinn, Donald N; Hagen, Scott C; Thompson, Donald R; Jensen, Robert E; Black, Peter G; Powell, Mark D; Guiney, John L; Cardone, Vincent J; Cox, Andrew T; Jan 2006; 9 pp.; In English

Contract(s)/Grant(s): N00014-02-1-0150

Report No.(s): AD-A475347; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475347>

The long-term goal of this partnership is to establish an operational forecasting system of the wind field and resulting waves and surge impacting the coastline during the approach and landfall of tropical cyclones. The results of this forecasting system would provide real-time information to the National Hurricane Center during the tropical cyclone season in the Atlantic for establishing improved advisories for the general public and federal agencies including military and civil emergency response teams.

DTIC

Cyclones; Forecasting; Real Time Operation; Surges; Tropical Storms

20080009881 Naval Research Lab., Bay Saint Louis, MS USA

Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003

Book, Jeffrey W; Signell, Richard P; Perkins, Henry; Nov 16, 2007; 21 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475409; NRL/JA/7330--06-6144; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475409>

Fifteen bottom-mounted Acoustic Doppler Current Profilers were deployed from October 2002 through April 2003 in the northern Adriatic Sea. Average transport from the portion of the Western Adriatic Current (WAC) along the Italian slope was 0.1470 +/- 0.0043 Sv, punctuated by bursts of more than twice that amount during storm events. Monthly means were calculated with times of strong wind-driven circulation excluded. These suggest a 2002/2003 seasonal separation consisting of October, December through February, and March through April. An extreme Po River flood influenced November conditions making seasonal categorization difficult. October generally had more kinetic energy and more vertical structure than other months, and near-inertial waves were more frequent in April and October. The Eastern Adriatic Current (EAC)/WAC system was clearly present in the means for all months. The cyclonic gyre north of the Po River was present October through February. Generally, in the WAC, over 50% of kinetic energy came from vertically uniform monthly mean flows. Strengthening of both EAC and WAC also occurs during sirocco storms.

DTIC

Adriatic Sea; Storms

20080009942 United Nations Educational, Scientific and Cultural Organization, Delft, Netherlands

Modeling of Hurricane Impacts

Roelvink, Dano; Reniers, Ad; Dongeren, Ap van; Thiel de Vries, Jaap van; Lescinski, Jamie; McCall, Robert; Walstra, Dirk-Jan; Dec 21, 2007; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N62558-06-C-2006

Report No.(s): AD-A475462; XB-NAREGCOC/2W; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This fifth interim report describes ongoing development and validation of the XBeach model as part of the MORPHOS

project and other activities over the period September-December 2007 (period extended due to delay in funding).

DTIC

Hurricanes; Models

20080009985 Army Research Lab., White Sands Missile Range, NM USA

Evaluation and Application of the Weather Research and Forecast Model

Passner, Jeffrey E; Dec 2007; 28 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475569; ARL-TR-4335; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Advanced Research version of the Weather Research and Forecasting model (WRF-ARM) was studied by the U.S. Army Research Laboratory (ARL) to determine how accurate and robust the model is under a variety of meteorological conditions, with an emphasis on fine resolution, short-range forecasts in complex terrain. This model study was done in support of the short-range Army tactical analysis/nowcasting system called the Weather Running Estimate-Nowcast (WRE-N) as well as for longer-range forecasting support. While much of the study centered on basic model output such as temperature, moisture, wind direction, and wind speed, the WRF parameterizations and output were also examined.

DTIC

Forecasting; Meteorology; Weather

20080010136 NASA Langley Research Center, Hampton, VA, USA; New Hampshire Univ., Durham, NH, USA

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study

Kim, S. Y.; Talbot, R.; Mao, H.; Blake, D.; Vay, S.; Fuelberg, H.; January 2007; 17 pp.; In English; Submitted to the Atmospheric Chemistry and Physics Discussions Journal to be published in Volume 7, pps. 17367-17400, 2007.; Original contains color and black and white illustrations

Contract(s)/Grant(s): NOAA AIRMAP NA06OAR4600189; Copyright; Avail.: Other Sources

A case study of convective outflow from the USA (U.S.) was examined using airborne measurements from NASA DC-8 flight 13 during the Intercontinental Chemical Transport Experiment North America (INTEX-NA). Mixing ratios of methane (CH₄) and carbon monoxide (CO) at 8-11 km altitude over the North Atlantic were elevated to 1843 ppbv and 134 ppbv respectively, while those of carbon dioxide (CO₂) and carbonyl sulfide (COS) were reduced to 372.4 ppmv and 411 pptv respectively. In this region, urban and industrial influence was evidenced by elevated mixing ratios and good linear relationships between urban and industrial tracers compared to North Atlantic back ground air. Moreover, low mixing ratios and a good correlation between COS and CO₂ showed a fingerprint of terrestrial uptake and minimal dilution during rapid transport over a 1-2 day time period. Analysis of synoptic conditions, backward trajectories, and photochemical aging estimates based on C₃H₈/C₂H₆ strongly suggested that elevated anthropogenic tracers in the upper troposphere of the flight region were the result of fast transport via convective uplifting of boundary layer air over the southeastern U.S. This mechanism is supported by the similar slopes values of linear correlations between long-lived (months) anthropogenic tracers (e.g., C₂Cl₄ and CHCl₃) from the flight region and the planetary boundary layer in the southeastern U.S. In addition, the aircraft measurements suggest that outflow from the U.S. augmented the entire tropospheric column at mid-latitudes over the North Atlantic. Overall, the flight 13 data demonstrate a pervasive impact of U.S. anthropogenic emissions on the troposphere over the North Atlantic.

Author

Airborne Equipment; Atlantic Ocean; Convection; Troposphere; North America; United States; DC 8 Aircraft

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*.

20080009648 California Inst. of Tech., Pasadena, CA USA

In vivo electrode implanting system

Collins, Jr., Earl R., Inventor; December 12, 1989; 7 pp.; In English

Patent Info.: Filed August 8, 1988; US-Patent-4,886,065; US-Patent-Appl-SN-229284; No Copyright; Avail.: CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009648>

A cylindrical intramuscular implantable electrode is provided with a strip of fabric secured around it. The fabric is woven

from a polyester fiber having loops of the fiber protruding. The end of the main cylindrical body is provided with a blunt conductive nose, and the opposite end is provided with a smaller diameter rear section with an annular groove to receive tips of fingers extending from a release tube. The fingers are formed to spring outwardly and move the fingertips out of the annular groove in order to release the electrode from the release tube when a sheath over the electrode is drawn back sufficiently. The sheath compresses the fingers of the release tube and the fabric loops until it is drawn back. Muscle tissue grows into the loops to secure the electrode in place after the sheath is drawn back. The entire assembly of electrode, release tube and sheath can be inserted into the patient's muscle to the desired position through a hypodermic needle. The release tube may be used to manipulate the electrode in the patient's muscle to an optimum position before the electrode is released.

Official Gazette of the U.S. Patent and Trademark Office

Implantation; In Vivo Methods and Tests

20080009665 BAE Systems, Huntsville, AL, USA

Eastern European Science Needs Sweeping Changes

Palosz, Witold; [2006]; 1 pp.; In English

Contract(s)/Grant(s): NAS8-02096; No Copyright; Avail.: Other Sources; Abstract Only

Sir - Two years ago your Editorial 'Eastern Promise' (vol. 426, p.369, 2003) and the News Feature 'Dreaming on Danube' (vol. 427, p.94-95,2004) as well as several subsequent correspondence letters (vol. 427, pp. 196 and 677, vol. 428, p.17) touched on the situation and potential growth in scientific research in the former Soviet block countries. I would like to revisit this topic. Right now the facts are sobering: while the average GNP per capita in those countries is a few times lower than the average for the rest of Europe, their average university ranking is another order of magnitude poorer (in the latest ARWU, of the first 123 European universities only 4, and that in the second half of the list only, are from the former Soviet block). That situation calls for drastic measures. Pumping extra money into the system would change little. The only real hope is in a new generation of young dynamic scientists setting the pace for academic life. That requires selection and promotion of the best of the best. Unfortunately much of the old guard, who is not up to scientific challenges of today and who attained their positions and influence under the old regime (often due to other than professional qualifications) resist any real changes. I believe that a major change for better could be achieved by implementation into law two key requirements: transparency and competitiveness. That means a transparency of every scientist achievements (particularly in terms of publications), and wide open and fair competition for academic positions. Those two conditions should be complemented by implementation of the position of academic ombudsman (to encourage/facilitate open discussions), special grant opportunities for young scientists, and transparency of the process of awarding research grants. I, as well as a number of my colleagues concerned with the future of science and higher education in Poland, discussing many important academic issues at the Independent Academic Forum (an Association with a non-commercial website, <http://www.naukaedukacja.tubaza.pl/>, with tens of thousands of visits last year), strongly believe that the above postulated changes in the academic environment would lead to a major improvement in the quality and standing of scientific research and higher education in Poland and other post-communist countries (which suffer similar problems). It is symptomatic that the voice of at least hundreds of the most active and usually younger scientists heard at our NFA forum is totally ignored by the old establishment and their decision making representatives who 'know better'. Major political and legislative decisions are called for. We are doing our best to press for such changes.

Author

Europe; Science; Research; Education

20080009686 Institute of Space Medico-Engineering, Beijing, China

Estimation of Percentage of Electrogastrogram Slow Wave Rhythm

Peng, Cheng; Wu, Zhong-chao; Ye, Da-tian; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 280-284; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To improve the estimation and the percentage of electrogastrogram (EGG) slow wave rhythm with power spectrum estimation and calculation rule set. Chirp Z-transformation was introduced for estimation power spectrum of EGG, which can obtain both high frequency resolution and accurate estimation of power; while the power proportion of main frequency components in each segment was used to substitute for conventional method in time domain. The variance of proposed method was about one-eighth of that of conventional method. Incorporating the power proportion of main frequency components, the proposed method gave better results especially for those EGG signals in which abnormal frequencies appeared frequently. As compared with the conventional method, the proposed method is less affected by segmentation process in estimating the percentage of EGG slow wave rhythm, which may promote future clinical applications.

Author

Stomach; Electrophysiology; Nerves; Rhythm (Biology); Estimates

20080009690 Shanghai Univ., Shanghai, China

Monitoring on Depth of Anesthesia Basing on a Rhythm Autocorrelation of EEG Signals

Zhang, Lian-yi; Zheng, Chong-xun; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 289-293; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To explore the relationship between the depth of anesthesia and the autocorrelation of spontaneous EEG signals, and to find a new indicator which is easily calculated and involves fewer channels of ECG. Eighteen patients with a surgical operation on chest or abdomen under general anesthesia served as the subjects. EEG signals of the patients were recorded. Change of a rhythm of the EEG signal during general anesthesia was investigated by autocorrelation. The changes of autocorrelation indicator in channels Fp(1)-C(2) and Fp(2)-C(2), were obvious and consistent with the process of anesthesia; The changes of autocorrelation $k(cr)$, in the two observed channels were almost synchronous. The autocorrelation indicator $k(cr)$, may be a new idea and a new tool for monitoring depth of anesthesia with fewer channels and the method will find wide prospect of application in clinic and in related scientific research work.

Author

Anesthesia; Autocorrelation; Electroencephalography; Signals; Physiological Responses; Surgery

20080009691 Sichuan Univ., Chengdu, China

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia

Wang, Sheng-wei; Sun, Xue-chuan; Liu, Kun-xiang; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 235-239; In English; See also [20080009685](#); Copyright; Avail.: Other Sources

To investigate the relation between polymorphisms of pulmonary surfactant protein A gene and adaptation to hypobaric hypoxia. The genotype proportions and allele frequencies of 86 Tibetan mountaineers and 90 sea-level Hans were examined with polymerase chain reaction-sequence specific primer (SSP-PCR) reaction for surfactant protein A gene. The constituent ratio of A/A, A/G and G/G genotypes in A1-aa62 locus and C/C, A/C and A/A genotypes in A2-aa223 locus showed significant statistic difference between highland group and the sea-level control group ($P < 0.05$). A1-aa62 G/G and A2-aa223 A/C genotype demonstrated high odds ratio in Tibetan mountaineers. Moreover, the comparisons of genotypes and alleles in A1-219 locus showed no significant difference between the plateau group and the sea-level Han control ($P > 0.05$). The single-nucleotide polymorphisms (SPN) in SP-A1aa62 and SP-A2aa223 may be associated with the adaptation to hypobaric hypoxia.

Author

Altitude Acclimatization; Hypoxia; Polymorphism; Proteins; Pulmonary Functions; Surfactants; Hypobaric Atmospheres; Genes

20080009694 Institute of Space Medico-Engineering, Beijing, China

Expression, Purification of hClock (35 -47) and Verification of Its Transmembrane Ability in Vitro

Gao, Mei; Zhao, Jing-hui; Ji, Zhi-hong; Liu, Yan-you; Xiao, Jing; Wang, Yu-hui; Wang, Zheng-rong; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 250-253; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To clone, express and purify hClock-(35-47) and to verify its transmembrane ability in vitro. cDNA sequence coded full-length hClock-(35-47) was synthesized and cloned into the expression plasmid PET-32a. After sequence analysis, the recombinants were transduced into E. coli. Rosetta(DE3), which was induced with IPTG to express hClock-(35-47). The products were purified by NTA-Ni affinity chromatography and then verified by means of SDS-PAGE and Western blotting. The vascular endothelial cell (ECV-304) was cultured with hClock-(35-47) which had been labeled with FITC in vitro, and was observed through fluorescence microscope to examine the transmembrane ability of hClock-(35-47). The hClock-(35-47) expression vector containing the insert of 51 bp was successfully constructed. The product is about 21 kD, which could react immunologically with standard anti-His-Tag antibody. Fluorescence microscopy showed that hClock-(35-47) has the ability to transfer into ECV-304 cells. Conclusion The recombinants hClock- (35-47) expressed by E. coli. Rosetta(DE3) remain its transmembrane ability. Its large-scale preparation will be helpful for further studies.

Author

Gene Expression; In Vitro Methods and Tests; Synthesis (Chemistry); Cloning (Biology)

20080009700 Peking Univ., China

Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease

Jin, Wei-hua; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 254-258; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To test the relationship between interleukin-1 receptor antagonist (IL-1 Ra) gene polymorphisms and the incidence of coronary artery disease and the effect of IL-1Ra gene polymorphisms in prediction of cardiovascular events. Polymerase chain reaction was used in a series of 220 patients of coronary arterial disease (CAD) and a control group of 100 cases. A prospective 12 months follow-up was conducted in the CAD patients and cardiovascular events were recorded. Serum levels of total cholesterol, triglyceride, low density lipoprotein cholesterol, fibrinogen, high-sensitivity C-reactive protein (hsCRP), and body mass index were measured. There was no significant difference between CAD patients and the control subjects in IL-1Ra gene polymorphisms. However, the IL-1Ra gene polymorphism was significantly higher among subjects in CAD patients without cardiovascular events than those with cardiovascular events. It suggests that IL-1Ra gene polymorphisms cannot predict the incident of coronary heart disease but might possess some protection for the patients of coronary arterial disease from cardiovascular events.

Author

Coronary Artery Disease; Interleukins; Polymorphism; Receptors (Physiology); Genes; Epidemiology

20080009761 NASA Johnson Space Center, Houston, TX, USA

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons

Myers, Tereance A.; Nickerson, Cheryl A.; Kaushal, Deepak; Ott, C. Mark; HonerzuBentrup, Kerstin; Ramamurthy, Rajee; Nelman-Gonzales, Mayra; Pierson, Duane L.; Philipp, Mario T.; [2008]; 37 pp.; In English; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Studies of neuronal dysfunction in the central nervous system (CNS) are frequently limited by the failure of primary neurons to propagate in vitro. Neuronal cell lines can be substituted for primary cells but they often misrepresent normal conditions. We hypothesized that a dimensional (3-D) cell culture system would drive the phenotype of transformed neurons closer to that of untransformed cells. In our studies comparing 3-D versus 2-dimensional (2-D) culture, neuronal SH-SY5Y (SY) cells underwent distinct morphological changes combined with a significant drop in their rate of cell division. Expression of the proto-oncogene N-myc and the RNA binding protein HuD was decreased in 3-D culture as compared to standard 2-D conditions. We observed a decline in the anti-apoptotic protein Bcl-2 in 3-D culture, coupled with increased expression of the pro-apoptotic proteins Bax and Bak. Moreover, thapsigargin (TG)-induced apoptosis was enhanced in the 3-D cells. Microarray analysis demonstrated significantly differing mRNA levels for over 700 genes in the cells of each culture type. These results indicate that a 3-D culture approach narrows the phenotypic gap between neuronal cell lines and primary neurons. The resulting cells may readily be used for in vitro research of neuronal pathogenesis.

Author

Apoptosis; Neurophysiology; Cells (Biology); Proteins; Phenotype; Pathogenesis; Ribonucleic Acids

20080009842 Hawaii Univ., Honolulu, HI USA

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts

Vincent, Dale S; Apr 2006; 222 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0474

Report No.(s): AD-A475294; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475294>

No abstract available

Abstracts; Asia; Conferences; India; Medical Services; Military Operations; Simulation

20080009846 Brigham and Women's Hospital, Boston, MA USA

Molecular and Clinical Predictors of Aggressive Prostate Cancer

Mucci, Lorelei A; Sep 2007; 38 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0562

Report No.(s): AD-A475306; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475306>

While prostate cancer is an important cause of cancer mortality, most men diagnosed with early prostate cancer experience

an indolent course. We are evaluating molecular and clinical predictors at diagnosis to distinguish lethal and indolent prostate cancer. In a related project, we have tested the predictive value of a previously identified multigene tumor signature, a 12-gene model. Risk classification based on the 12-gene model predicted development of lethal disease 20 years hence. The best discrimination came from combining information from the 12-gene markers and clinical data, which perfectly classified the lowest risk stratum where no one died of cancer and provided greater discriminatory ability (AUC 0.78) than the clinical model alone (AUC 0.71), $p=0.04$. We now are testing the 12-gene and additional tumor markers within a prostatectomy cohort of 950 men from the Physicians Health Study and Health Professionals Follow-up Study. We have constructed high-density tumor tissue microarrays on the cohort, and have undertaken immunohistochemistry to characterize protein expression. We have also completed abstraction of clinical data from medical records and pathology reports. Preliminary analyses and model building to test the discriminatory ability of the gene markers and clinical data are now underway, with the ultimate goal to provide prognostication of lethal and indolent prostate cancer.

DTIC

Cancer; Predictions; Prostate Gland

20080009847 Mount Sinai School of Medicine, New York, NY USA

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women

Bovbjerg, Dana H; Aug 2007; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0501

Report No.(s): AD-A475307; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475307>

Breast cancer cells are known to bear determinants that would allow tumor specific immune responses. However, initiation and amplification of such immune responses are critically dependent upon the balance in TH1 and TH2 cytokine profiles. This molecular epidemiological study evaluates the impact that variability in cytokine profiles, (inferred from functional polymorphisms in cytokine genes), may have on breast cancer risk among urban African-American women. In the first phase of the study, DNA collected and approved for additional study as part of a previously funded Case-Control investigation ($n=1600$) will be assessed for cytokine polymorphisms. Because cytokine profiles are also known to be affected by environmental factors, particularly levels of stress, this study also evaluates the relative contribution of genotype and stress influences using data collected for that purpose from a sub-sample of healthy Controls ($n=400$) recruited from the graduates of the larger study. Results will allow evaluation of the possibility that deficits in cytokine responses due to genetic or environmental factors may contribute to breast cancer risk. Based on these findings, women at risk for breast cancer because of polymorphisms in genes important to effective immune surveillance could be targeted for innovative prevention strategies including stress reduction and immune modulators.

DTIC

Africa; Breast; Cancer; Females; Genetics; Mammary Glands; Surveillance

20080009849 Salk Inst., La Jolla, CA USA

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals

Barlow, Carolee; Aug 2005; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-99-1-9561

Report No.(s): AD-A475317; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475317>

Neuropathy target esterase (NTE) is a membrane-associated protein with serine esterase activity. A class of organophosphate (OP) compounds, used in insecticides and as chemical weapons, are capable of inhibiting NTE and lead to progressive neuropathies. We were able to isolate and characterize the human and mouse NTE (mNTE) genomic loci. We also identified a second member of the NTE family. Transgenic mice with a disrupted mNTE gene and which express the beta-galactosidase gene under the endogenous mNTE promoter were generated. Analyses demonstrated that mNTE is essential for embryonic development and that mNTE is highly expressed in the developing spinal cord and eye, as well as in the testes and throughout the brain. Heterozygous mice have a 39% decrease in brain enzyme activity and increased mortality after exposure to NTE-inhibiting EOPFs. Wild-type mice treated with low amount of EOPF and untreated mNTE heterozygous mice show elevated motor activity, suggesting that partial inhibition of NTE activity leads to hyperactivity. Further analysis of these mice also allowed us to identify NTE as a lysophospholipase.

DTIC

Brain; Chemical Warfare; Cholinesterase; Deterioration; Enzymes; Insecticides; Mental Performance; Nervous System; Targets

20080009851 Michigan Univ., Ann Arbor, MI USA

Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer

Xu, Liang; Aug 2007; 5 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0648

Report No.(s): AD-A475323; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475323>

The major goal of this Concept Award project is to explore the anti-Her-2 antibody as targeting ligand to establish the self-assembled nanovectors for targeted siRNA delivery to Her-2(+) breast cancer. Our hypothesis is (1) anti-Her-2 antibody will specifically target nanovectors to Her-2(+) breast cancer and thus efficiently deliver siRNA to the target cells; (2) siRNA-nanovectors will potently silence the Bcl-2/Bcl-xL gene expression induce apoptosis in human breast cancer cells that depend on Bcl-2/Bcl-xL for survival. Since the start of this project we have tested various conditions for the self-assembled nanovectors based on our patented nanotechnology platform. However we have met with technical difficulty using original technique of non-covalent complexing some modification is needed to make Herceptin-nanovectors. Therefore we requested and obtained approval a one-year no cost extension to optimize the conditions for nanovectors. Based on the data obtained in this first year the anti-Her-2-nanovector shows increased transfection efficiency in Her-2(+) breast cancer cells with 2-5-fold increase of reporter gene expression as compared with non-targeted one. We have also designed and validated siRNA/shRNA on Bcl-2 and Bcl-xL that can knockdown target genes expression up to 90%. These data provide us the foundation to accomplish the project in the second year.

DTIC

Breast; Cancer; Ligands; Mammary Glands; Therapy; Tumors

20080009853 State Univ. of New York, Stony Brook, NY USA

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays

Du, Guangwei; Sep 2007; 6 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0690

Report No.(s): AD-A475328; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475328>

Compared with other serum polypeptides, autoantibodies have many appealing features as biomarkers including sensitivity, stability, and easy detection. Anti-lipid autoantibodies are routinely used in the diagnosis of autoimmune disease, but their potential for cancer diagnosis has not been explored. Dysregulation of cellular signaling in cancer cells would be expected to lead to irregular metabolism of many lipids, which could be sensed by immune system and cause the production of novel autoantibodies. Indeed, recent reports describe anti-lipid antibody production in cancer patients. Our hypothesis is that a broad and irregular change in lipid profiles in breast cancer cells results in the production of anti-lipid antibodies that could be used as biomarkers for early diagnosis. We propose to generate arrayed lipids on the membranes (lipid microarrays), and use them to examine global anti-lipid profiles at different stages of carcinogenesis in a transgenic breast cancer model. We have successfully set up the technology for lipid microarrays in our laboratory. Using fluorescently labeled secondary antibodies and an internal control labeled with a different fluorophor, we have greatly improved the sensitivity and reproducibility compared to the first generation of lipid microarrays. We are currently collecting more serum from newly bred mice at different ages.

DTIC

Biomarkers; Breast; Cancer; Diagnosis; Lipids; Mammary Glands; Prognosis; Serums

20080009861 Industrial Coll. of the Armed Forces, Washington, DC USA

Spring 2006. Industry Study. Health Care Industry

Jan 2006; 29 pp.; In English

Report No.(s): AD-A475354; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475354>

Despite the trillions of dollars spent on the USA health care industry there are major systemic problems For many Americans the health care industry is a complicated and disorganized array of systems and processes that are inaccessible, unaffordable, and of low quality with increasing technological change. Americans expect more out of the health care delivery

system. The lessons learned from this report are that there is an urgent need to develop a national health care strategy, a rationale for health care spending and a system that provides some level of health care for everyone.

DTIC

Health; Industries; Medical Services; Public Health

20080009869 Army Research Inst. of Environmental Medicine, Natick, MA USA

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series

Liu, Jean; McKenna, Thomas M; Gribok, A; Beidleman, Beth A; Tharion, William J; Reifman, Jaques; Jan 3, 2008; 15 pp.; In English

Contract(s)/Grant(s): M08-01

Report No.(s): AD-A475380; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475380>

We have developed a fuzzy logic-based algorithm to qualify the reliability of heart rate (HR) and respiratory rate (RR) vital-sign time-series data by assigning a confidence level to the data points while they are measured as a continuous data stream. The algorithm's membership functions are derived from physiology-based performance limits and mass-assignment-based data-driven characteristics of the signals. The assigned confidence levels are based on the reliability of each HR and RR measurement as well as the relationship between them. The algorithm was tested on HR and RR data collected from subjects undertaking a range of physical activities, and it showed acceptable performance in detecting four types of faults that result in low-confidence data points (receiver operating characteristic areas under the curve ranged from 0.67 (SD 0.04) to 0.83 (SD 0.03), mean and standard deviation (SD) over all faults). The algorithm is sensitive to noise in the raw HR and RR data and will flag many data points as low confidence if the data are noisy; prior processing of the data to reduce noise allows identification of only the most substantial faults. Depending on how HR and RR data are processed, the algorithm can be applied as a tool to evaluate sensor performance or to qualify HR and RR time-series data in terms of their reliability before use in automated decision-assist systems.

DTIC

Algorithms; Confidence Limits; Fuzzy Systems; Heart Rate; Respiration; Respiratory Rate; Respiratory System; Time Series Analysis

20080009870 Army Research Inst. of Environmental Medicine, Natick, MA USA

Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance

Cadarette, Bruce S; Santee, William R; Robinson, Scott B; Sawka, Michael N; Aug 2007; 6 pp.; In English

Report No.(s): AD-A475381; M06-14; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475381>

Delivered by U.S. Army Soldier IP : 153.103.190.11 Tue, 04 Dec 2007 irradiance. Aviat Space Environ Med 2007; 78:809-13. Background: This study evaluated adding reflective thermal inserts (RTI) to reduce the physiological strain during exercise-heat stress with a radiant load. RTI were used with a U.S. Army desert battle dress uniform, body armor, and helmet. Methods: Four male volunteers attempted four trials (10 min rest followed by 100 min walking at 1.56 m s⁻¹). All trials were at 40.0 C dry bulb (T_{db}), 12.4 C dew point (T_{dp}), 20% RH, and 1.0 m s⁻¹ wind speed. On 2 d, there was supplementary irradiance (I) with globe temperature (T_{bg}) 56.5 C and on 2 d there was no supplementary irradiance (I) with T_{bg} T_{db}. Trial conditions were: 1) RTI and armor with supplementary irradiance (RA I); 2) plain armor with supplementary irradiance (PA I); 3) RTI and armor with no supplementary irradiance (RA I); and 4) plain armor with no supplementary irradiance (PA I). Results: Endurance times were not significantly different among trials. With one exception, armor and helmet interior and exterior surface temperatures were not significantly different between either RA I and PA I or RA I and PA I. Temperature on the inside of the helmet in RA I (47.1 ± 1.4 C) was significantly lower than in PA I (49.5 ± 2.6 C). There were no differences for any physiological measure (core temperature, heart rate, mean weighted skin temperature, forehead skin temperature, sweating rate, evaporative cooling, rate of heat storage) between either RA I and PA I or RA I and PA I. Conclusions: Results showed no evidence that wearing RTI with body armor and helmet reduces physiological strain during exercise-heat stress with either high or low irradiance.

DTIC

Heat Tolerance; Inserts; Irradiance

20080009871 Army Research Inst. of Environmental Medicine, Natick, MA USA

Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water

Castellani, John W; O'Brien, Catherine; Tikuisis, Peter; Sils, Ingrid V; Xu, Xiaojiang; Sep 20, 2007; 9 pp.; In English
Report No.(s): AD-A475382; M07-25; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475382>

Cold thermoregulatory model(CTM) have primarily been developed to predict core temperature (t sub core) responses during sedentary immersion. Few studies have examined their efficacy to predict T(sub core) during exercise cold exposure. The purpose of this study was to compare observed T(sub core) responses during exercise in cold water with the predicted T(sub core) from a three-cylinder (3-CTM) and a six-cylinder (6-CTM) model, adjusted to include heat production from exercise. A matrix of two metabolic rates (0.44 and 0.88 m/s walking), two water temperatures (10 and 15 C), and two immersion depths (chest and waist) were used to elicit different rates of T(sub core) changes. Root mean square deviation (RMSD) and nonparametric.

DTIC

Cold Tolerance; Cold Water; Cores; Physical Exercise; Temperature Control; Thermoregulation

20080009872 Walter Reed Army Inst. of Research, Silver Spring, MD USA

AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions

Scott, Christine T; Powers, Timothy E; Li, Yuanzhang; Han, Weiwei; Weber, Natalya S; Gary, Janice K; Niebuhr, David W; Packnett, Elizabeth; Dec 17, 2007; 77 pp.; In English

Contract(s)/Grant(s): W81XWH-07-F-0067

Report No.(s): AD-A475388; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475388>

The Accession Medical Standards Analysis and Research Activity (AMSARA) has completed its tenth year of providing the DoD with evidence-based evaluations of accession medical standards. The Annual Report presents descriptive statistics that AMSARA compiles annually and publishes for historical and reference value as well as special studies. Studies in this Annual Report include a study of stress fractures in female military recruits, an abstract from the Assessment of Recruit Motivation and Strength (ARMS) study, and a survival analysis of new recruits requiring a medical waiver for knee or shoulder instability. The descriptive statistics are for applicants who enlisted in 2005. Data are collected while the recruits remain on active duty for their first year (during 2006 for this report). The data are then collated, cleaned, and analyzed during the first half of the subsequent year (2007 for this report). By convention, the annual report is dated for the last year of data on which the analyses were performed.

DTIC

Medical Science; Military Personnel; Motivation; Physical Fitness

20080009873 Science Applications International Corp., Abingdon, MD USA

Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity

Schenning, Amanda M; Bevilacqua, Vicky L H; Morrissey, Kevin M; Rice, Jeffrey S; Oct 2007; 18 pp.; In English

Contract(s)/Grant(s): DAAD13-03-D-0017

Report No.(s): AD-A475390; ECBC-TR-578; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475390>

Ascertaining the toxicity of samples containing proteins such as ricin and SEB requires an activity assay that yields accurate and reproducible results. The ToxTrak™ system was investigated as a possible quantitative assay. ToxTrak™ is a commercially available kit supplied by the Hach Company (Loveland, Colorado). The ToxTrak™ system correlates the toxicity of a sample with its effect on the respiration of bacteria, as measured by percent inhibition. Initially, our intent was to develop a modified version of the ToxTrak™ test that would be amenable for use with a microplate reader. Development of a plate reader version of the test, however, first required the successful demonstration of the unmodified ToxTrak™ method to indicate toxicity due to protein toxins. ToxTrak™ proved to be useful for identifying the toxicity of various levels of cyanide. However, when we evaluated the kit for the ability to indicate toxicity due to a protein known to be toxic to E. coli, we were not able to achieve reproducible results. Due to the inconsistencies obtained for percent inhibition while utilizing the standard protocol with protein toxins, we chose not to pursue attempts to develop a modified method for use with a microplate reader.

DTIC

Proteins; Toxicity; Toxins and Antitoxins

20080009945 Pennsylvania Univ., Philadelphia, PA USA

Genetic Counseling for Breast Cancer Susceptibility in African American Women

Hughes, Chanita; Sep 2007; 47 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-00-1-0262

Report No.(s): AD-A475474; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Despite recommendations to increase the cultural sensitivity of genetic counseling, such programs have not been developed or evaluated. The objectives of this study were to develop a Culturally Tailored Genetic (CTGC) protocol for African American women and evaluate its impact on decision-making and satisfaction about BRCA1/2 testing, quality of life, and cancer control practices. With the support of this award, we have developed a comprehensive body of empirical knowledge on genetic counseling and testing among African American women. Our work has evaluated responses to CTGC versus SGC, identified predictors of test result acceptance, and assessed outcomes of genetic counseling among African American women at increased risk for hereditary disease. Importantly, we have developed a method for addressing cultural beliefs and values related to cancer prevention and control in a medically underserved population.

DTIC

Africa; Breast; Cancer; Females; Genetics; Mammary Glands

20080009946 Michigan Univ., Ann Arbor, MI USA

Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision

Wang, Shanmeng; Feb 2007; 88 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0213

Report No.(s): AD-A475475; No Copyright; Avail.: Defense Technical Information Center (DTIC)

XIAP (X-linked inhibitor of apoptosis protein) is a promising new therapeutic target for the design of an entirely new class of effective and non-toxic cancer therapy to improve survival and quality of life of prostate cancer patients. New therapies targeting XIAP may prove to be especially effective to overcome apoptosis-resistance of prostate cancer cells. Using a powerful computational structure-based design strategy, we have designed and synthesized new, non-peptide, cell-permeable small-molecule inhibitors of XIAP. The most potent inhibitors bind to XIAP with nanomolar affinities and are highly potent in inhibition of cell growth in androgen-independent human prostate cancer cell lines. Furthermore, such inhibitors are highly effective in enhancing the activity of other anticancer drugs in human prostate cancer cells. Importantly, these inhibitors have a low toxicity to normal cells. Taken together, our studies have led to the discovery of highly promising small-molecule inhibitors of XIAP. Further optimization of these promising lead compounds may ultimately lead to the development of a new class of anticancer drugs for the treatment of advanced human prostate cancer.

DTIC

Biomimetics; Cancer; Peptides; Prostate Gland; Therapy

20080009947 Pennsylvania Univ., Philadelphia, PA USA

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination

Domchek, Susan M; Sep 2007; 18 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0619

Report No.(s): AD-A475478; No Copyright; Avail.: Defense Technical Information Center (DTIC)

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. The authors 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 they have not found ductal lavage a feasible strategy for the detection of tumor antigens, they have made significant progress on vaccination strategies in women with metastatic breast cancer.

DTIC

Antigens; Breast; Cancer; Detection; Enzymes; Females; Health; Immunology; Mammary Glands; Markers; Metastasis; Targets; Therapy

20080009953 Yale Univ., New Haven, CT USA

Genomic Instability and Breast Cancer

Chen, Junjie; Oct 2007; 87 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0470

Report No.(s): AD-A475489; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Genomic instability is one of the key initiating events that lead to breast cancer development. We would like to gain further insights into the regulation of genomic stability and how the disruption of this regulation contributes to tumorigenesis. In the past year, we have identified several new components in the DNA damage pathway that act upstream of BRCA1. We have also discovered a novel link between aging and breast cancer development. In addition, we have established a platform for large-scale purification of protein complexes for the study of networks involved in breast cancer development. On top of these, we are also interested in developing novel agents for cancer treatment. In this arena, we have set up a screen for cytotoxic agents that would target Chfr-deficient tumor cells. In a collaborative study, we identified compounds that would disrupt the interaction between BRCA1 and its binding partners for potential use as radiation sensitizer. Moreover, we have initiated a collection of stable cell lines expressing various protein kinases for the screening of specific kinase inhibitors. Together, these studies will help us understand breast cancer.

DTIC

Breast; Cancer; Damage; Deoxyribonucleic Acid; Genes; Genome; Mammary Glands; Stability

20080009956 Pennsylvania Univ., Philadelphia, PA USA

Evaluation of Listeria Monocytogenes Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer

Tsai, Jeff H; Lee, William M; Sep 2007; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0338

Report No.(s): AD-A475505; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The potential benefits of antiangiogenic therapy have been dramatically shown in mouse tumor models but have been less striking in human clinical trials. A possible explanation for this disparity in treatment outcomes is that the vasculature of human tumors may be more resistant to antiangiogenic therapies. This may be due, at least in part, to extensive pericyte coverage of vessels in many common human cancers, such as breast cancers, compared to a relative deficiency of pericytes surrounding vessels in commonly studied mouse tumors. We have identified two autochthonous mouse mammary tumor models, MMTV-infected and MMTV-neu mice, with high pericyte coverage of tumor vessels that may better recapitulate human breast cancer. The endothelial-specific receptor tyrosine kinase, Tie2, regulates microvessel pericyte coverage and activates endothelial cell (EC) signal transduction pathways that promote their survival (e.g. the PI3 kinase-AKT signaling pathway). Our previous studies using an inducible decoy receptor of Tie2 (Tie2Ex) to inhibit Tie2 activation in K1735 murine melanoma tumors showed a decrease in activated AKT expression in ECs and increased EC apoptosis. Tie2Ex expressing tumors also had decreased pericyte coverage, suggesting Tie2 inhibition in tumors can destabilize vessels. We have generated transgenic MMTV-infected and MMTV-neu mice that express Tie2Ex to inhibit Tie2 activation in mammary tissues. The presence of Tie2Ex does not appear to affect EC pAKT or pERK expression downstream of Tie2 signaling in mammary glands. We are currently awaiting tumors to develop in these transgenic mice to study the effect of Tie2 inhibition in mammary tumors.

DTIC

Breast; Cancer; Mammary Glands; Mice; Vaccines

20080009957 Duke Univ., Durham, NC USA

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy

Bydlon, Torrev M; Sep 2007; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0340

Report No.(s): AD-A475506; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The objective of the proposed research is to develop a device to reduce the frequency of breast re-excision surgery in patients with breast malignancies. The purpose of Task 1 was to design a spectral imaging system that will provide two-dimensional measurements approximately 0.5-2.0 mm within breast tissues. Monte Carlo simulations determined that the spacing between each imaging channel should be at least 10mm to have an SNR greater than 100. The monochromator slit size and channel spacing determined that there could be 25,600 um illumination fibers and 25 channels. Four collection fibers per channel was optimal to be certain that all fibers could be imaged on the CCD without any cross-talk between signals. The purpose of Task 2 was to build a fiber optic probe with two imaging channels rather than the entire imaging probe to test the

conceptual design. The two-channel probe has been built in our laboratory using 4, 200 micron collection fibers and 1, 600 micron illumination fiber in each channel.

DTIC

Breast; Cameras; Infrared Spectroscopy; Near Infrared Radiation; Needles

20080009958 Johns Hopkins Univ., Baltimore, MD USA

Structure and Mechanism-Based Design of ErbB Receptor Inhibitors

Leahy, Daniel J; Sep 2007; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0449

Report No.(s): AD-A475507; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The HER4/ErbB4 receptor tyrosine kinase is inhibited by lapatinib (Tykerb[®]), and a crystal structure of the HER4/ErbB4 kinase domain complexed with lapatinib reveals an inactive conformation of the kinase and the specific molecular contacts made between HER4/ErbB4 and lapatinib. A crystal structure of the HER4/ErbB4 kinase domain in an active conformation reveals an asymmetric dimer contact virtually identical to an interaction observed for the related epidermal growth factor receptor. Mutagenesis studies demonstrate this dimer contact to be essential for normal kinase activation and show this activation mechanism to be a general feature of the ErbB family of receptor tyrosine kinases. An integral membrane form of the epidermal growth factor receptor has been expressed and purified and will form the basis for future structural and functional studies of the EGFR/ErbB family of receptors.

DTIC

Crystal Structure; Inhibitors; Ligands

20080009959 Wisconsin Univ., Madison, WI USA

Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer

Carlson, Coby B; Kiessling, Laura L; Sondel, Paul M; Jul 2007; 38 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0466

Report No.(s): AD-A475508; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Strategies to eradicate tumors have long been sought in the medical and scientific research communities. We envisioned that small molecules could be used to decorate the unwanted cells as foreign and evoke a potent immune response to destroy them. We then developed a bifunctional conjugate that contains two binding motifs: one targets a receptor on the surface of cancer cells and the other interacts with naturally occurring human antibody. Through a series of proof-of-principle experiments, we demonstrated that this compound targets cells and can recruit antibodies simultaneously. Moreover, we obtained very promising in vitro cytotoxicity data illustrating that we can selectively target cancer cells over normal ones. These results have led our team to extend the concept into in vivo testing with an animal model (however, this work is at its beginning stages).

DTIC

Antibodies; Breast; Cancer; Targets

20080009960 George Mason Univ., Manassas, VA USA

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Major Biological Threat Agents

Popov, Serguei; Aug 2007; 163 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-C-0122

Report No.(s): AD-A475509; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We found that secreted virulence factors other than anthrax toxins play important role in anthrax. Our experiments revealed several pathogenic mechanisms relevant to the activity of anthrax proteases and hemolysins in cultured cells and mice challenged with B. anthracis spores. In the reporting period the research was focused on the hemostatic abnormalities manifested in the degradation of von Willebrand factor, release of this factor in response to anthrax proteins, and degradation of the ADAMTS13 protease. The results favor a hypothesis that an anticoagulant activity of secreted pathogenic factors along with the disruption of barrier permeability could be considered as a major cause of hemorrhage during infection. Studies on host cell signaling cascades allowed identify the cell survival pathways as new potential pharmacological targets. Inhibition of AKT pathway in spore-challenged cells indicates a strong contribution of the edema toxin generated cyclic AMP to the lethal outcome of infection. We conclude that in murine model the host response to anthrax infection is an important factor contributing to lethality. This hypothesis is substantiated by the protective effect of adenosine derivative in combination with

ciprofloxacin in anthrax-challenged mice. We identified B. anthracis HSP60 protein as a potential TLR2 agonist capable of binding host cell CD91 receptor and inducing host inflammatory response.

DTIC

Armed Forces; Biological Weapons; Enzyme Inhibitors; Enzymes; Infectious Diseases; Inhibitors; Peptides; Protease; Therapy; Toxins and Antitoxins; United States

20080009961 Columbia Univ., New York, NY USA

Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis

Kitajewski, Jan K; May 2007; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0540

Report No.(s): AD-A475511; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The overall objective is to define the interaction between Notch and VEGFR-3 signaling in breast cancer. We are examining a role for Notch in breast tumor vessels and attempting to block Notch and VEGFR-3 activity in breast tumors grown in mice. We proposed two aims: 1) studies of Notch/Dll4 function in murine mammary tumorigenesis and 2) studies of the inhibitory effects of a Notch antagonist (Notch decoy) in a murine mammary tumor model. In aim 1, to study the role for notch in murine mammary tumorigenesis, progress has been made in developing two new transgenic lines that will allow for conditional activation or inactivation of Notch specifically within the endothelium. The first mouse line, EF1-Notch1IC can be manipulated in a conditional fashion, as demonstrated by lethality if activated in embryonic endothelium. The second mouse line, EF1-Notch1ECD/Fc, has been generated and is being further tested. We have carried out experiments to demonstrate that breast tumor xenograft growth is inhibited by the Notch decoy, an antagonist made up of the Notch1 extracellular domain fused to the Fc protein, Notch1ECD/Fc. This block appears to be a result of reduced tumor angiogenesis. This strategy, now shown to inhibit

DTIC

Breast; Inhibitors; Notches; Tumors

20080009962 Beth Israel Deaconess Medical Center, Boston, MA USA

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion

Christoforides, Claudine; Sep 2007; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0697

Report No.(s): AD-A475517; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The goal of my project as outlined in the original application is to analyze the role of Protein Kinase D (PKD) in breast cancer cell motility, the phenotype critical for metastasis. The work I have conducted includes the establishment of gene expression system in breast cancer cell lines vital for a comprehensive study of contribution of PKD towards invasive migration. By means of these systems, I have demonstrated that loss or inhibition of PKD results in a migration defect phenotype in a highly metastatic breast cancer cell line. I have also found that loss or inhibition of PKD results in apoptotic cell death.

DTIC

Breast; Cancer; Enzymes; Mammary Glands; Migration; Phosphorus; Proteins

20080009963 California Univ., Los Angeles, CA USA

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer

Wainberg, Zev; Jul 2007; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0324

Report No.(s): AD-A475520; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The overall goal of this project is to validate novel targets and develop new antibody reagents for the diagnostic imaging and treatment of prostate cancer. N-cadherin is a cell surface marker that is overexpressed in hormone refractory prostate cancer which could have possible diagnostic or therapeutic utility. We observed that the cadherin profiles of certain prostate cancer cell lines and xenografts correlated with their level of invasiveness and that amongst certain hormone refractory xenograft models, there was a consistent upregulation of N-Cadherin when compared to its androgen dependent counterpart. We sought to validate N-Cadherin as a target in hormone refractory prostate cancer and determine if blockade of this pathway could decrease invasion and metastasis. We generated specific monoclonal antibodies against different domains to determine

if blockade could decrease invasion and metastasis. Ongoing in vitro and in vivo studies will determine if this protein can be validated as an effective imaging and therapeutic target.

DTIC

Antibodies; Blocking; Cancer; Hormones; Prostate Gland; Proteins; Refractories

20080009964 Mayo Clinic, Rochester, MN USA

Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer

Datta, Kaustubh; Oct 2007; 31 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0901

Report No.(s): AD-A475528; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Metastatic spread of prostate cancer is the second leading cause of deaths of men in the USA. Although there are many ways to treat non-metastatic form of prostate cancer, only androgen-deprivation therapy is available for the extensive stage. Again, the cancer will often progress to an androgen refractory (independent), metastatic stage. Recent reports have suggested that the expression of VEGF-C is directly correlated with lymph node dissemination in prostate cancer. This finding leads us to think that understanding the role of angiogenic molecules like VEGF-C, -D in prostate cancer metastasis. Interestingly our results suggest a function of VEGF-C, which is directly related to its role in increasing the metastatic propensity of prostate cancer rather than inducing lymphangiogenesis. We have also delineated both positive (FOXO-1, ROS and RalA) and negative (NKX3.1) regulatory pathways that can be accounted for VEGF-C synthesis in prostate cancer cells.

DTIC

Cancer; Lymphatic System; Metastasis; Prostate Gland

20080009965 Armed Forces Radiobiology Research Inst., Bethesda, MD USA

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression

Xiao, Mang; Inal, Cynthia E; Parekh, Vaishali I; Chang, Cheng-Min; Whitnall, Mark H; May 1, 2007; 45 pp.; In English

Report No.(s): AD-A475529; MOL-35394; No Copyright; Avail.: Defense Technical Information Center (DTIC)

5-Androstenediol stimulates hematopoiesis and enhances survival in animals exposed to ionizing radiation 'IR', suggesting this steroid may act on hematopoietic progenitor cells. We used γ -irradiated primary human CD34+ hematopoietic progenitor cells to show 5-AED protects hematopoietic cells from IR damage, as shown by enhanced cell survival clonogenicity, proliferation, and differentiation. Unlike in tumor cells, IR did not induce NF- κ B 'NFkB' activation in primary progenitors. However, IR stimulated I κ B β release from NFkB/I κ B complexes and caused NFkB1 'p50' degradation. 5-AED stabilized NFkB1 in irradiated cells, as well as inducing NFkB gene expression and NFkB activation 'DNA binding'. 5-AED stimulated interleukin-6 'IL-6' and granulocyte colony-stimulating factor 'G-CSF' secretion. The survival-enhancing effects of 5-AED on clonogenic cells were abrogated by siRNA inhibition of NFkB gene expression, and also by neutralization of G-CSF with antibody. The effects of 5-AED on survival and G-CSF secretion were blocked by the NFkB inhibitor MG132. 5-AED had no effect on accumulation of the pro-apoptotic factor p53 after IR, as determined by Western blot. The results indicate that NFkB1 degradation after IR may be responsible for the radiation sensitivity of CD34+ cells, as compared to tumor cells. 5-AED exerts survival-enhancing effects on irradiated human hematopoietic progenitor cells via induction, stabilization, and activation of NFkB, which results in increased secretion of hematopoietic growth factor G-CSF.

DTIC

Deoxyribonucleic Acid; Hematopoiesis; Hematopoietic System; Irradiation; Ribonucleic Acids; Survival

20080009966 Health Research, Inc., Buffalo, NY USA

New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling

Zhang, Haitao; Oct 2007; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0598

Report No.(s): AD-A475532; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Early stage prostate cancer depends heavily on androgen signaling for growth and clonal expansion. In the previous report, we have demonstrated the combination of selenium, which down-regulates androgen receptor, and finasteride, a 5 α -reductase inhibitor, has a synergistic effect in inhibiting the growth of prostate cancer cells, suggesting this novel combination is a promising strategy for preventing prostate cancer. We have also demonstrated that FOXO1A plays a critical role in mediating apoptosis induction by selenium. In the second grant period, we have focused our effort on the following areas: (1) studying the impact of the selenium and finasteride combination on androgen signaling; (2) Identifying the

pro-apoptotic target genes of FOXO1 that are induced by selenium; (3) studying the potential AR antagonistic effect of finasteride. The last was not proposed in the original application. But we strongly believe this is a topic worthwhile pursuing since a thorough understanding of the activities of finasteride is important for its use in clinical practices.

DTIC

Cancer; Prevention; Prostate Gland; Selenium

20080009967 Louisiana State Univ., Shreveport, LA USA

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair

Yin, Hong; Sep 2007; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475534; W81XWH-06-1-0578; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In breast cancer stem-like cells could contribute not only to the initiation of the cancer but also to recurrence because of the resistance of stem cells to chemo/radiation therapy. From several breast cancer cell lines we have demonstrated the existence of breast cancer stem-like cell subpopulations based on the recognized cell surface markers CD44+/CD24 and ABCG2-mediated Hoechst efflux. After radiation we found that a CD44+/CD24- or low subpopulation showed increased clonogenic survival in MCF-7 and HCC1937 cell lines but not in the MDA-MB231 cell line. However examination of NHEJ activity and expressed proteins of NHEJ did not show any significant difference among the subpopulations suggesting that the increased radiation resistance might not be related to the NHEJ. Furthermore activation of ATM/ATR pathway was significantly different among the subpopulations of MCF-7, HCC1937 and MDA-MB-231 cell lines and these differences in the activation of ATM/ATR pathway may explain the differential radiation resistance of subpopulations.

DTIC

Breast; Cancer; Deoxyribonucleic Acid; Mammary Glands; Proteins; Stem Cells

20080009969 Duke Univ., Durham, NC USA

Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods

Chen, Ying; Dobbins, III, James T; Apr 2008; 41 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0462

Report No.(s): AD-A475536; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Digital breast tomosynthesis is a three-dimensional imaging technique with limited-angle series of projection images that allows the reconstruction of depth information along the breast. This study investigated optimized and compared different tomosynthesis methods and chose the optimal one for breast tomosynthesis imaging. We investigated several 3-D tomosynthesis reconstruction algorithms and studied the effect of acquisition parameters for different candidate reconstruction algorithms according to computer simulation and physical measurements of impulse response analysis modulation transfer function and noise power spectrum. We applied a relative noise-equivalent quanta (NEQ) analysis to compare candidate algorithms and acquisition parameters. Additionally the importance of point-by-point back projection (BP) for isocentric motion in breast tomosynthesis was investigated. It improves the in-plane sharpness of structures such as microcalcifications which bear important meaning in clinical tasks for breast cancer detection.

DTIC

Digital Systems; Optimization; Tomography; Transfer Functions

20080009973 Duke Univ., Durham, NC USA

Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer

Ogden, Hilary; Oct 2007; 9 pp.; In English

Contract(s)/Grant(s): W81XWH-06-1-0745

Report No.(s): AD-A475543; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Our studies show that agonist-bound PR-B can stimulate the proliferation of breast cancer cells by functioning in a direct manner to induce transcription of E2F1 and E2F2, key regulators of cell cycle progression. We demonstrate that although the MAPK pathway is important for phosphorylation of RB and release of E2F, its activation is not dependent on PR signaling through Src family kinases. Further, we found that PRMs such as asoprisnil that do not induce classic PR target genes can activate E2F signaling and stimulate proliferation. Future studies will explore this novel mechanism by which PR regulates breast cancer proliferation so that we can better enable development of PRMs that effectively inhibit breast tumor growth.

DTIC

Breast; Cancer; Females; Hormones; Mammary Glands; Therapy

20080009979 California Univ., San Francisco, CA USA

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes

Datta, Anirban; Aug 2007; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0671

Report No.(s): AD-A475558; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The highly organized architecture of cells in normal epithelial organs such as the mammary glands is lost in cancer cells. Both the normal as well as the neoplastic phenotypes can be recapitulated in 3-dimensional cell cultures in vitro. Our goal was to revert transformed breast cancer cell lines in vitro back to normal and identify the molecular and genetic changes required for this reversal. We have identified the Rho family GTPase Cdc42 and two proteins that regulate the Rho family of proteins as key molecules in this process. Inhibition of Cdc42 blocks the hyper-proliferation of transformed acini while activation causes partial reversal of polar architecture without blocking hyperproliferation suggesting that a tight control of Cdc42 function is required for maintaining normal acini. Knocking down of the Cdc42 activator p-Pix also led to a loss of polarity. A knock-down of PI 90RhoGAP which inhibits Rho was also found to cause polarity loss. Both of the loss of polarity phenotypes could be rescued by growing these acini in natural basement membrane Matrigel. These findings are consistent with the idea that epithelial transformation requires a combination of genetic as well as extracellular changes.

DTIC

Breast; Cancer; Gene Expression; Genetics; In Vitro Methods and Tests; Mammary Glands; Mutagenesis; Phenotype

20080010005 Tufts Univ., Boston, MA USA

Veterinary Research Manpower Development for Defense

Anwer, M S; Sep 2007; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-06-1-0640

Report No.(s): AD-A475629; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long-term goal of this training program is to increase veterinary research manpower by providing research training to veterinary students. The program is expected to develop a pipeline of research-ready veterinarians to solve biodefense and public health problems facing the USA in general, and the U.S. armed forces in particular. The following training programs offered by Cummings school of veterinary medicine were proposed for this purpose: (1) Summer Research Program, (2) Four-year joint DVM/Master's degree in Public Health (DVM/MPH), (3) Four-year joint DVM/Master of Science degree in Laboratory Animal Medicine (DVM/MS-LAM), and (4) a Five-year joint DVM/MS in Biomedical Science (DVM/MS-BS). This progress report includes accomplishments achieved during the first year of this multi-year program in the following areas: Program Implementation, Recruitment, and Progress to Date. Reportable outcomes are as follows: (1) Two trainees were recruited in the DVM/MPH joint degree program, (2) One trainee was recruited in the DVM/MS-LAM joint degree program, (3) Seven trainees were recruited in the summer research program, and (4) One trainee joined the U.S. Army in 2007. The three trainees recruited in the joint degree program are continuing their training, and the 7 trainees recruited in the summer research program have completed their research projects. No publications have yet resulted from the research conducted by the trainees, however, the breadth of research conducted by them is revealed in the abstracts of their research project proposals, which are included in the appendix. No major problems were encountered with recruiting trainees or maintaining trainee interest in the program during the first year; hence, the investigators plan to continue the program as originally proposed.

DTIC

Education; Manpower; Medical Science; Students; Veterinary Medicine

20080010013 Armed Forces Radiobiology Research Inst., Bethesda, MD USA

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia

Farese, Ann M; Hunt, Pamela; Grab, Lisa B; MacVittie, Thomas J; May 1996; 8 pp.; In English

Report No.(s): AD-A475659; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study compared the therapeutic potential of recombinant, native versus pegylated megakaryocyte growth and development factor 'rMGDF and PEG-rMGDF, respectively', as well as that of the combined administration of PEG-rMGDF and r-methionyl human granulocyte colony-stimulating factor 'r-metHuG-CSF' on hematopoietic reconstitution after 700 cGy ⁶⁰Co gamma, total body irradiation in nonhuman primates. After total body irradiation animals received either rMGDF, PEG-rMGDF, r-metHuGCSF, PEG-rMGDF and r-metHuG-CSF, or HSA. Cytokines in all MGDF protocols were administered daily for 18 d, HSA and r-metHuG-CSF alone were administered for 21-23 d. Either rMGDF, PEG-rMGDF, or PEG-rMGDF

and r-metHuG-CSF administration significantly diminished the thrombocytopenic duration 'platelet count [PLT],20,000/ml' to 0.25, 0, and 0.5 d, respectively, and the severity of the PLT nadir '28,000, 43,000, and 30,000/ ml, respectively' as compared with the controls '12.2 d duration, nadir 4,000/ml', and elicited an earlier PLT recovery. Neutrophil regeneration was augmented in all cytokine protocols and combined PEG-rMGDF and r-metHuG-CSF further decreased the duration of neutropenia compared with r-metHuG-CSF alone. These data demonstrated that the administration of PEGrMGDF significantly induced bone marrow regeneration versus rMGDF, and when combined with r-metHuG-CSF significantly enhanced multilineage hematopoietic recovery with no evidence of lineage competition. 'J. Clin. Invest. 1996. 97:2145-2151.'

DTIC

Bone Marrow; Colonies; Hematopoiesis; Hematopoietic System; Leukocytes; Primates; Radiation Effects; Stimulation

20080010623 NASA Johnson Space Center, Houston, TX, USA

Thermostable Shelf Life Study

Perchonok, M. H.; Antonini, D. K.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The objective of this project is to determine the shelf life end-point of various food items by means of actual measurement or mathematical projection. The primary goal of the Advanced Food Technology Project in these long duration exploratory missions is to provide the crew with a palatable, nutritious and safe food system while minimizing volume, mass, and waste. The Mars missions could be as long as 2.5 years with the potential of the food being positioned prior to the crew arrival. Therefore, it is anticipated that foods that are used during the Mars missions will require a 5 year shelf life. Shelf life criteria are safety, nutrition, and acceptability. Any of these criteria can be the limiting factor in determining the food's shelf life. Due to the heat sterilization process used for the thermostabilized food items, safety will be preserved as long as the integrity of the package is maintained. Nutrition and acceptability will change over time. Since the food can be the sole source of nutrition to the crew, a significant loss in nutrition may determine when the shelf life endpoint has occurred. Shelf life can be defined when the food item is no longer acceptable. Acceptability can be defined in terms of appearance, flavor, texture, or aroma. Results from shelf life studies of the thermostabilized food items suggest that the shelf life of the foods range from 0 months to 8 years, depending on formulation.

Author

Consumables (Spacecrew Supplies); Life (Durability); Food Processing; Thermal Stability; Nutrition

20080010624 NASA Johnson Space Center, Houston, TX, USA

Effect of Processing and Subsequent Storage on Nutrition

Perchonok, Michele; Lai, Oiki Sylvia; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The objective of this research is to determine the effects of thermal processing, freeze drying, irradiation, and storage time on the nutritional content of food, to evaluate the nutritional content of the food items currently used on the International Space Station and Shuttle, and to establish the need to institute countermeasures. (This study does not seek to address the effect of processing on nutrients in detail, but rather aims to place in context the overall nutritional status at the time of consumption).

Derived from text

Nutrition; Food Processing; Space Flight Feeding; Storage Stability

20080010656 NASA Johnson Space Center, Houston, TX, USA

Life Sciences Data Archive (LSDA)

Fitts, M.; Johnson-Throop, Kathy; Thomas, D.; Shackelford, K.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

In the early days of spaceflight, space life sciences data were been collected and stored in numerous databases, formats, media-types and geographical locations. While serving the needs of individual research teams, these data were largely unknown/unavailable to the scientific community at large. As a result, the Space Act of 1958 and the Science Data Management Policy mandated that research data collected by the National Aeronautics and Space Administration be made available to the science community at large. The Biomedical Informatics and Health Care Systems Branch of the Space Life Sciences Directorate at JSC and the Data Archive Project at ARC, with funding from the Human Research Program through

the Exploration Medical Capability Element, are fulfilling these requirements through the systematic population of the Life Sciences Data Archive. This program constitutes a formal system for the acquisition, archival and distribution of data for Life Sciences-sponsored experiments and investigations. The general goal of the archive is to acquire, preserve, and distribute these data using a variety of media which are accessible and responsive to inquiries from the science communities.

Author

Life Sciences; Data Bases; Data Acquisition; Space Flight; NASA Programs; Data Management; Health

20080010661 NASA Johnson Space Center, Houston, TX, USA

Formation of Clustered DNA Damage after High-LET Irradiation: A Review

Hada, Megumi; Georgakilas, Alexandros G.; [2008]; 25 pp.; In English; Original contains color illustrations; Copyright;

Avail.: CASI: [A03](#), Hardcopy

Radiation can cause as well as cure cancer. The risk of developing radiation-induced cancer has traditionally been estimated from cancer incidence among survivors of the atomic bombs in Hiroshima and Nagasaki. These data provide the best estimate of human cancer risk over the dose range for low linear energy transfer (LET) radiations, such as X- or gamma-rays. The situation of estimating the real biological effects becomes even more difficult in the case of high LET particles encountered in space or as the result of domestic exposure to particles from radon gas emitters or other radioactive emitters like uranium-238. Complex DNA damage, i.e., the signature of high-LET radiations comprises by closely spaced DNA lesions forming a cluster of DNA damage. The two basic groups of complex DNA damage are double strand breaks (DSBs) and non-DSB oxidative clustered DNA lesions (OCDL). Theoretical analysis and experimental evidence suggest there is increased complexity and severity of complex DNA damage with increasing LET (linear energy transfer) and a high mutagenic or carcinogenic potential. Data available on the formation of clustered DNA damage (DSBs and OCDL) by high-LET radiations are often controversial suggesting a variable response to dose and type of radiation. The chemical nature and cellular repair mechanisms of complex DNA damage have been much less characterized than those of isolated DNA lesions like an oxidized base or a single strand break especially in the case of high-LET radiation. This review will focus on the induction of clustered DNA damage by high-LET radiations presenting the earlier and recent relative data.

Author

Deoxyribonucleic Acid; Linear Energy Transfer (LET); Irradiation; Cytology; Biology

20080010662 NASA Johnson Space Center, Houston, TX, USA; Wyle Labs., Inc., Houston, TX, USA

Pulmonary Toxicity Studies of Lunar Dusts in Rodents

Lam, Chiu-wing; James, John T.; Taylor, Larry; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

NASA will build an outpost on the lunar surface for long-duration human habitation and research. The surface of the Moon is covered by a layer of fine, reactive dust, and the living quarters in the lunar outpost are expected to be contaminated by lunar dust. NASA established the Lunar Airborne Dust Toxicity Advisory Group (LADTAG) to evaluate the risk of exposure to the dust and to establish safe exposure limits for astronauts working in the lunar habitat. Because the toxicity of lunar dust is not known, LADTAG has recommended investigating its toxicity in the lungs of laboratory animals. After receiving this recommendation, NASA directed the JSC Toxicology Laboratory to determine the pulmonary toxicity of lunar dust in exposed rodents. The rodent pulmonary toxicity studies proposed here are the same as those proposed by the LADTAG. Studies of the pulmonary toxicity of a dust are generally done first in rodents by intratracheal instillation (ITI). This toxicity screening test is then followed by an inhalation study, which requires much more of the test dust and is labor intensive. We succeeded in completing an ITI study on JSC-1 lunar dust simulant in mice (Lam et al., *Inhalation Toxicology* 14:901-916, 2002, and *Inhalation Toxicology* 14: 917-928, 2002), and have conducted a pilot ITI study to examine the acute toxicity of an Apollo lunar (highland) dust sample. Preliminary results obtained by examining lung lavage fluid from dust-treated mice show that lunar dust was somewhat toxic (more toxic than TiO₂, but less than quartz dust). More extensive studies have been planned to further examine lung lavage fluid for biomarkers of toxicity and lung tissues for histopathological lesions in rodents exposed to aged and activated lunar dust samples. In these studies, reference dusts (TiO₂ and quartz) of known toxicities and have industrial exposure limits will be studied in parallel so the relative toxicity of lunar dust can be determined. The ITI results will also be useful for choosing an exposure concentration for the animal inhalation study on a selected lunar dust sample, which is included as a part of this proposal. The animal inhalation exposure will be conducted with lunar dust simulant

prior to the study with the lunar dust. The simulant exposure will ensure that the study techniques used with actual lunar dust will be successful. The results of ITI and inhalation studies will reveal the toxicological risk of exposures and are essential for setting exposure limits on lunar dust for astronauts living in the lunar habitat.

Author

Toxicity; Lunar Dust; Habitats; Exposure; Contamination; Toxicology

20080010833 Institute of Space Medico-Engineering, Beijing, China

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice

Jiang, Xiao-hui; Ye, Shan; Wang, Yu-hui; Liu, Yan-you; Jiang, Zhou; Zhang, Lu; Wang, Zheng-rong; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 354-357; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objective of this work is to study the influence of circadian gene Clock on the fertility of male mice by interfering the expression of Clock with RNAi in male mice. RNAi technology was applied to interfere the expression of circadian gene Clock in testis of mice. The interference efficiency of the RNAi was evaluated by Western blot. Sperm count, sperm motility, testis weight and in vitro fertilization (IVF) rate and litter size were used to estimate the fertility of male mice. Results The RNAi plasmid targeting circadian gene Clock attenuated the expression of Clock in testis of mice, reduced the fertility of male mice in vivo and in vitro including litter sizes and sperm fertility in vitro. Circadian gene Clock is related to the function of production in male mice.

Author

Circadian Rhythms; Gene Expression; Males; Mice; Fertility; Genetics

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*.

20080009685 Institute of Space Medico-Engineering, Beijing, China

Space Medicine and Medical Engineering, Volume 20, No. 4

Chen, Shan-guang, Editor; Wang, Xian-min, Editor; Bai, Jing, Editor; Bai, Yan-qiang, Editor; Sun, Xi-qing, Editor; Hong, Feng, Editor; Su, Hong-yu, Editor; Wang, Zhi-kui, Editor; Lu, Yao-feng, Editor; Sun, Meng-jie, Editor; Li, Jian-hui, Editor; Su, Hong-yu, Editor; August 2007; ISSN 1002-0837; 84 pp.; In English; In Chinese; See also 20080009686 - 20080009701; Original contains black and white illustrations

Report No.(s): CN-11-2774/R; Copyright; Avail.: Other Sources

The following topics were discussed: Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia; Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells; Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films; Expression, Purification of hClock (35 -47) and Verification of Its Transmembrane Ability in Vitro; Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease; Relationship between Surface EMG and Angle of Elbow Joint; Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle; Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics; An Automatic Algorithm for Image Segmentation in Urine Sediment Examination; Estimation of Percentage of Electrogastrogram Slow Wave Rhythm; Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images; Monitoring on Depth of Anesthesia Basing on a Rhythm Autocorrelation of EEG Signals; Telemetric Localization of Detecting Capsule in Gastrointestinal Tract; Effects of Vibration Noise under the Feet on Balancing Ability in Elder People; Viscoelastic Evaluating Guideline for Cryopreserved Arteries; and Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress. Derived from text

Aerospace Medicine; Cardiovascular System; Electroencephalography; Gastrointestinal System; In Vitro Methods and Tests; Heart Diseases; Proteins; Immune Systems; Electromyography

20080009687 Institute of Space Medico-Engineering, Beijing, China

An Automatic Algorithm for Image Segmentation in Urine Sediment Examination

Chen, Yu; Yan, Zhuang-zhi; Wang, Li-ming; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 274-279; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To study an accurate algorithm for automatic image segmentation in urine sediment examination. Methods:

The Mumford-Shah model and level set method were integrated and used to segment the urine sediment image. The algorithm was evaluated by simulation and real data experiment with the improved version of Zhang's criterion. Results: The Mumford-Shah model based Level Set algorithm could eliminate the over-segment produced by the Level Set, and always had a lowest as compared with the other three algorithms, such as expectation maximization (EM), region grow and watershed. Timing results showed that the narrow band Level Set algorithm had a highest computational expense ($> 1.8 \times 10^{(exp 4)}$ s) while the Mumford-Shah model based Level Set algorithm was much faster (5.42 s). Conclusion: The Mumford-Shah model based Level Set algorithm can achieve urine sediment examinations accurately with both fast speed and strong robustness to the noise. Key words: level set; Mumford-Shan model ; image segmentation ; segmentation evaluation ; urine sediment image
Author

Urine; Sediments; Segments; Imaging Techniques; Algorithms; Robustness (Mathematics)

20080009689 University of Science and Technology, Anhui, China

Viscoelastic Evaluating Guideline for Cryopreserved Arteries

Zhao, Gang; Lei, Dong; Zhang, Bao; Qin, Feng-hua; Yu, Fei; Li, Su-ping; Guo, Xiao-jie; Liu, Zhong; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 304-307; In Chinese; See also [20080009685](#); Copyright; Avail.:

Other Sources

Objective: To establish a new evaluating guideline for clinical applications of cryopreserved arteries. Methods: The creep behaviors of the cryopreserved arteries were observed with different cryopreservation methods by using a dynamic mechanical analyzer (DMA-2980, TA Instruments, New Castle, Delaware, USA). Results: The viscoelasticity of cryopreserved arteries was apparently less than that of the fresh group, and it means that cryopreservation was sure to damage the viscoelasticity of arteries to a certain extent; the loss of viscoelasticity of the cryopreserved arteries increased along with the increase of cooling rates from 1.5, 5, through 10 C/min, and it was obvious that 1.5 C/min was the optimal cooling rate for all the cryopreservation methods used in the present study. Conclusion: The degree of accordance of the creep behaviors of cryopreserved arteries with the theoretical models set up in this study could be used for evaluating the viscoelasticity of cryopreserved arteries; the remained viscoelasticity of cryopreserved arteries could be used as a novel evaluating guideline for optimization of the cryopreservation processes. Key words : artery ; viscoelasticity evaluation ; cryopreserve ; creep behavior Address reprint requests to: ZHAO Gang. Lab of Biomechanics, Department of Modern Mechanics, University of Science and Technology of China, Hefei Anhui 230027, China

Author

Arteries; Viscoelasticity; Creep Properties; Biodynamics; Mathematical Models

20080009692 Shanghai Jiao Tong Univ., China

Telemetric Localization of Detecting Capsule in Gastrointestinal Tract

Guo, Xu-dong; Yan, Guo-zheng; He, Wen-hui; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 294-298; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To develop a method for localizing a detecting capsule in the gastrointestinal tract. Methods: A three-axis magnetic sensor was sealed in the detecting capsule. Three flat coils were fixed on patients' back. The coils were excited one by one to generate electromagnetic fields. The position and the orientation of the capsule could be determined by telemetering the signals from the magnetic sensor incorporated in the capsule. Results: The telemetric localization system worked successfully. A localization model describing the relationship between the magnetic field strength and the position and orientation of the capsule, was correctly established basing on the principle of magnetic dipoles, and neural network algorithm was employed to solve a non-linear equation set. Conclusion: The results showed that the localization method is feasible and the precision is higher than existing methods. The localization device can perform consecutive tracking and can be made into a portable type. After putting into practice, the device can also be used in food selection for astronauts by monitoring their gastrointestinal parameters in space. Key words : detecting capsule ; telemetric localization ; energizing coils ; magnetic dipoles model ; neural network; energy function

Author

Gastrointestinal System; Telemetry; Detection; Magnetic Dipoles; Neural Nets

20080009693 Chongqing Univ., Chongqing, China

Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle

Hou, Wen-sheng; Xu, Rong; Zheng, Xiao-lin; Ma, Li; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 264-268; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To study the relationship between handgrip level and characteristics of surface electromyogram (sEMG) signal from forearm muscles.

Author

Electromyography; Muscles; Forearm; Loads (Forces)

20080009695 Institute of Space Medico-Engineering, Beijing, China

Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells

Zhang, Yi; Li, Yan; Tu, Qiu-fen; Chen, Huai-qing; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 240-244; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Abstract: Objective: To investigate the effects of fluid shear stress on interleukin-8(IL-8) mRNA expression in human endothelial cell line-EA. Hy926 cells. Methods: Weibel-Palade body and factor VIII related antigen were detected to identify cultured EA. Hy926 cells. Quantitative reversal transcription- polymerase chain reaction was also used to assay IL-8 mRNA expression. Results: It was found that the growth feature of EA. Hy926 cells in vitro culture was similar with that of human umbilical vein endothelial cells (HUVECs) . Meanwhile, it also had the typical features of endothelial cells, i. e. Weibel-Palade body in plasma and express factor WI related antigen. IL-8 mRNA expression of endothelial cells exposed to low shear stress(0.420 Pa) increased at 1 h and reached its peak value at 2 h, then gradually decreased at 3 h and kept the descending trend throughout the remained time course of the study, as compared with that in cells not treated with shear stress. Also after exposed to shear stress of different levels(0.182, 0.420, 1.000, 1.640 Pa) for 2 h, in which IL-8 mRNA expression of EA. Hy926 cells decreased with the increase of the intensity of the shear stress. Conclusion The results suggest that fluid stress can induce the expression of IL-8 mRNA in EA. Hy926 cells. EA. Hy926 cells might be used as a cell source in the field of biorheological research of endothelial cells. Key words: interleukin-8 ;quantitative RT-PCR ;fluid shear stress ; endothelial cells

Author

Shear Stress; Fluid Flow; Interleukins; Immune Systems; Plasmas (Physics); In Vitro Methods and Tests; Veins

20080009696 Tsinghua Univ., Beijing, China

Effects of Vibration Noise under the Feet on Balancing Ability in Elder People

Wu, Fang-fang; Wang, Ren-cheng; Jin, De-wen; Zhang, Ji-chuan; Mitobe, Kazu-taka; Youshimura, Noboru; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 299-303; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To enhance sensory and balancing ability by applying vibration under the feet of elder people. Methods: Vibration noise was applied under the feet of 6 healthy elderlies and 8 young volunteers. Balancing performance was evaluated using a FASTRAK system. Four sway parameters (The maximum excursions range of the AP, the maximum excursions range of the ML, path length and swept area) were measured under 5 conditions. Results: All four sway parameters decreased with vibration in the elderlies. Three of the four sway parameters (Path length, the maximum excursions range of the ML and swept area) were significant decreases ($P < 0.05$). Conclusion: The results suggest that low level vibration, when applied to the feet, enhances the balancing performance of healthy elderlies. These findings suggest that vibration-based devices may be helpful in improving balance control in elder people. Key words: balance control ; balance ability ;vibration noise

Author

Vibration Effects; Balancing; Length

20080009697 Institute of Space Medico-Engineering, Beijing, China

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress

Yu, Chang; Zhang, Yi; Liu, Xiao-Heng; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 308-312; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

The migration of endothelial cell induced by fluid shear stress is related to many physiological and pathological responses in organism. The redistribution of membrane receptors and proteins, caused by shear stress, is a vital step for cell migration, followed by chemical reactions and signal transduction. Then cell morphological changes are induced, such as polarity, protrusion, and adhesion, which lead to the migration of endothelial cell at last. The goal of this paper is to review what is

known about the mechanical models of endothelial cell migration and the responses of cells to fluid flow. It is helpful for better understanding the intrinsic mechanism of mechano-chemical signal pathway of the migration of endothelial cells induced by fluid shear stress.

Author

Shear Stress; Fluid Flow; Physiological Responses; Membranes; Bioengineering; Chemical Reactions; Proteins; Genetics

20080009698 Xian Univ., Shaanxi, China

Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films

Guan, Ying-ting; Li, Yi; Tao, Yong-zhen; Jin, Zhi-hao; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 245-249; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To find a new material for biomedical scaffold. Composite films from poly-L-lactic acid (PLLA) and opal powder were fabricated. Osteoblasts seeded on the composite films and control ones were examined. Cell densities and morphologies on these films were studied by scanning electron microscopy (SEM). Cell growth and differential function were assessed by 3-(4,5-dimethyltyiazol-2-yl)-2,5-diphenyl tetrazolium bromide(MTT) test. SEM study showed that the addition of powder could improve the adhesion between osteoblasts and the composite films. MTT test proved that cell proliferation was improved when opal powder was added. This improvement came from the negative ion given off by the opal powder. The negative ions either accumulate at the cell membrane or enter into the cells. Accumulation of negative ions at the cell membrane leads to a change of electric potential difference across the cell membrane which should be in a proper range for the cells to perform their normal physiological function. If the negative ions enter the cells, they may take part in biochemical reactions whenever possible. In this way, the ions also affect the cell normal metabolism. Osteoblasts grow well on opal/PLLA composites and the negative ion from opal powder is responsible for the enhancement of cell growth. This study provides a new material for biomedical scaffold.

Author

Lactic Acid; Osteoblasts; Powder (Particles); Aerospace Medicine; Fabrication; Composite Materials; Polymeric Films

20080009699 Chongqing Univ., Chongqing, China

Relationship between Surface EMG and Angle of Elbow Joint

Wu, Xiao-ying; Hou, Wen-sheng; Zheng, Xiao-lin; Wang, Hong; Zha, Min; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 259-263; In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To explore the correlation between the moving angle of elbow joint and surface electromyogram signal (sEMG) activities of biceps and triceps. Methods: The eigenvalue of sEMG during elbow joint moving under constant load were calculated with means of root mean square (RMS) and integrated electromyogram (iEMG) in time domain. Results: The experimental results showed that both the characteristics of RMS and iEMG for biceps differed from those of triceps. The sEMG activities of biceps increased with the increment of elbow joint angle, while those from triceps reached to the maximum values when elbow joint angle was 90deg. Furthermore, the sEMG activities of triceps at the elbow angle of 45deg was similar with that when elbow angle was 135deg. Conclusion: The sEMG from biceps and triceps can reflect the moving angle of elbow joint under constant load.

Author

Electromyography; Joints (Anatomy); Elbow (Anatomy); Loads (Forces); Bioengineering; Muscles

20080009701 Institute of Space Medico-Engineering, Beijing, China

Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics

Liao, Qi-mei; Dong, Ziu-zhen; Fu, Feng; Chen, Guang-sheng; Yan, Yan; Zhang, Ju-liang; Ling, Rui; Wi, Jia-xue; Guo, Qing-xia; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 269-273; In English; See also [20080009685](#); Copyright; Avail.: Other Sources

Objective: To study the influence of breast cancer infiltration sites on multi-frequency impedance characteristics and provide some basic data and experimental basis of the 'dark spots' on the images of breast cancer in electrical impedance scanning (EIS) . Methods: According to the locations, the infiltrations were divided into two groups: i. e, infiltration into fat tissue and that into the mammary gland. Model 1255 B impedance/gain-phase analyzer of Solartron Company was used to facilitate the four-electrode measuring method by which the multi-frequency impedance characteristics of breast cancer and their surrounding tissues were measured in vitro. The measurements were made with frequencies from 1 Hz to 1 MHz. Cole-Cole parameters were calculated by non-linear curve fitting using computer program. Results: From the real parts of impedance characteristics, it was found that the resistivity of the breast cancer was remarkably lower in the infiltrated fat tissue

than in their surrounding fat tissues whereas the resistivity of the cancer is remarkably higher in the infiltrated mammary gland than in their surrounding gland tissues. From the imaginary parts of impedance characteristics, differences existed in the characteristic frequencies. In fat tissues, the frequency was about 1 kHz, the frequency of the breast cancer was 200 k - 300 kHz and that of the mammary gland tissues was 2 k -3 kHz. Conclusion: There are significant differences between the breast cancer and their surrounding tissues in both measured and modeled data. Further analysis showed that the significant differences in impedance characteristics of the surrounding tissues are in connection with the locations infiltrated by the tumor. Key words : impedance spectroscopy ; breast cancer; electrical impedance characteristics ; electrical impedance scanning

Author

Cancer; Electrical Impedance; Mammary Glands; In Vitro Methods and Tests; Infiltration

20080009715 NASA Johnson Space Center, Houston, TX, USA

Cognitive Functioning in Long Duration Head-down Bed Rest

Seaton, Kimberly A.; Slack, Kelley J.; Sipes, Walter A.; Bowie, Kendra; January 2008; 13 pp.; In English

Contract(s)/Grant(s): NIH M01-RR-0073; Copyright; Avail.: CASI: [A03](#), Hardcopy

The Space Flight Cognitive Assessment Tool for Windows (WinSCAT) is a self-administered battery of tests used on the International Space Station for evaluating cognitive functioning. Here, WinSCAT was used to assess cognitive functioning during extended head-down bed rest. Thirteen subjects who participated in 60 or 90 days of 6 deg head-down bed rest took WinSCAT during the pre-bed rest phase, the in-bed rest phase, and the post-bed rest (reconditioning) phase of study participation. After adjusting for individual baseline performance, 12 off-nominal scores were observed out of 351 total observations during bed rest and 7 of 180 during reconditioning. No evidence was found for systematic changes in off-nominal incidence as time in bed rest progressed, or during the reconditioning period. Cognitive functioning does not appear to be adversely affected by long duration head-down bed rest. Individual differences in underlying cognitive ability and motivation level are likely explanations for the current findings.

Author

Bed Rest; Mental Performance; Long Duration Space Flight; Head Down Tilt; Astronaut Performance; Aerospace Medicine

20080009737 NASA Johnson Space Center, Houston, TX, USA; Cleveland Clinic, Cleveland, OH, USA

Foot Reaction Forces during Long Duration Space Flight

Gopalakrishnan, R.; Rice, A. J.; Genc, K. O.; Maender, C. C.; Kuklis, M. M.; Humphreys, B.; Cavanagh, P. R.; February 04, 2008; 1 pp.; In English; NASA Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA

Contract(s)/Grant(s): NCC9-153; Copyright; Avail.: CASI: [A01](#), Hardcopy

Musculoskeletal changes, particularly in the lower extremities, are an established consequence of long-duration space flight despite exercise countermeasures. It is widely believed that disuse and reduction in load bearing are key to these physiological changes, but no quantitative data characterizing the on-orbit movement environments currently exist. Here we present data from the Foot Experiment (E318) regarding astronaut activity on the ground and on-orbit during typical days from 4 International Space Station (ISS) crew members who flew during increments 6, 8, 11, and 12.

Author

International Space Station; Long Duration Space Flight; Musculoskeletal System; Physical Exercise; Astronauts; Countermeasures; Weightlessness

20080009760 NASA Johnson Space Center, Houston, TX, USA

Validation of Procedures for Monitoring Crewmember Immune Function

Crucian, Brian; Stowe, Raymond; Mehta, Satish; Uchakin, Peter; Quiariarte, Heather; Pierson, Duane; Sams, Clarence; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

There is ample evidence to suggest that space flight leads to immune system dysregulation. This may be a result of microgravity, confinement, physiological stress, radiation, environment or other mission-associated factors. The clinical risk (if any) from prolonged immune dysregulation during exploration-class space flight has not yet been determined, but may include increased incidence of infection, allergy, hypersensitivity, hematological malignancy or altered wound healing. Each of the clinical events resulting from immune dysfunction has the potential to impact mission critical objectives during exploration-class missions. To date, precious little in-flight immune data has been generated to assess this phenomenon. The majority of recent flight immune studies have been post-flight assessments, which may not accurately reflect the in-flight status of immunity as it resolves over prolonged flight. There are no procedures currently in place to monitor immune function or

its effect on crew health. The objective of this Supplemental Medical Objective (SMO) is to develop and validate an immune monitoring strategy consistent with operational flight requirements and constraints. This SMO will assess immunity, latent viral reactivation and physiological stress during both short and long duration flights. Upon completion, it is expected that any clinical risks resulting from the adverse effects of space flight on the human immune system will have been determined. In addition, a flight-compatible immune monitoring strategy will have been developed with which countermeasures validation could be performed. This study will determine, to the best level allowed by current technology, the in-flight status of crewmembers' immune systems. The in-flight samples will allow a distinction between legitimate in-flight alterations and the physiological stresses of landing and readaptation which are believed to alter R+0 assessments. The overall status of the immune system during flight (activation, deficiency, dysregulation) and the response of the immune system to specific latent virus reactivation (known to occur during space flight) will be thoroughly assessed. The first in-flight activity for integrated immunity very recently occurred during the STS-120 Space Shuttle mission. The protocols functioned well from a technical perspective, and accurate in-flight data was obtained from 1 Shuttle and 2 ISS crewmembers. Crew participation rates for the study continue to be robust.

Author (revised)

Aerospace Medicine; Immune Systems; Spacecrews; Space Flight; In-Flight Monitoring

20080009780 Toronto Univ., Ontario, Canada

A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station

Lim, Dawn Y.; October 25, 2007; 25 pp.; In English; Emergency Medicine Residency Program, 18 March 2008, Toronto, Ontario, Canada; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A viewgraph describing the medical contingencies of the international partner flight surgeons and biomedical engineer flight controllers aboard the International Space Station is shown.

Derived from text

Simulation; Aerospace Medicine; Contingency; International Space Station; Flight Surgeons

20080009787 NASA Johnson Space Center, Houston, TX, USA

Human Factors in Training

Barshi, Immanuel; Byrne, Vicky; Arsintescu, Lucia; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Future space missions will be significantly longer than current Shuttle missions and new systems will be more complex than current systems. Increasing communication delays between crews and Earth-based support means that astronauts need to be prepared to handle the unexpected on their own. As crews become more autonomous, their potential span of control and required expertise must grow to match their autonomy. It is not possible to train for every eventuality ahead of time on the ground, or to maintain trained skills across long intervals of disuse. To adequately prepare NASA personnel for these challenges, new training approaches, methodologies, and tools are required. This research project aims at developing these training capabilities. Training efforts in FY07 strongly focused on crew medical training, but also began exploring how Space Flight Resource Management training for Mission Operations Directorate (MOD) Flight Controllers could be integrated with systems training for optimal Mission Control Center operations. Beginning in January 2008, the training research effort will include team training prototypes and tools. The Training Task addresses Program risks that lie at the intersection of the following three risks identified by the Project: 1) Risk associated with poor task design; 2) Risk of error due to inadequate information; 3) Risk associated with reduced safety and efficiency due to poor human factors design.

Derived from text

Astronaut Training; Education; Human Factors Engineering; General Overviews; Space Shuttle Missions

20080009788 NASA Johnson Space Center, Houston, TX, USA

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt

Serrador, J. M.; Black, F. O.; Schligel, Todd T.; Lipsitz, L. A.; Wood, S. J.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Copyright; Avail.: Other Sources;

Abstract Only

Change to upright posture results in reductions in cerebral perfusion pressure due to hydrostatic pressure changes related to gravity. Since vestibular organs, specifically the otoliths, provide information on position relative to gravity, vestibular inputs may assist in adaptation to the upright posture. The goal of this study was to examine the effect of direct vestibular

stimulation on cerebral blood flow (CBF). To examine the role of otolith inputs we screened 165 subjects for vestibular function and classified subjects as either normal or impaired based on ocular torsion. Ocular torsion, an indication of otolith function, was assessed during sinusoidal roll tilt of 20 degrees at 0.01 Hz (100 sec per cycle). Subjects with torsion one SD below the mean were classified as impaired while subjects one SD above the mean were considered normal. During one session subjects were placed in a chair that was sinusoidally rotated 25 degrees in the roll plane at five frequencies: 0.25 & 0.125 Hz for 80 sec, 0.0625 Hz for 160 sec and 0.03125 Hz and 0.015625 Hz for 320 sec. During testing, CBF (transcranial Doppler), blood pressure (Finapres), and end tidal CO₂ (Puritan Bennet) were measured continuously. Ocular torsion was assessed from infrared images of the eyes. All rotations were done in the dark with subjects fixated on a red LED directly at the center of rotation. In the normal group, dynamic tilt resulted in significant changes in both blood pressure and cerebral blood flow velocity that was related to the frequency of stimulus. In contrast the impaired group did not show similar patterns. As expected normal subjects demonstrated significant ocular torsion that was related to stimulus frequency while impaired subjects had minimal changes. These data suggest that vestibular inputs have direct effects on cerebral blood flow regulation during dynamic tilt. Supported by NASA.

Author

Vestibules; Blood Pressure; Brain Circulation; Gravitation; Hydrostatic Pressure; Otolith Organs; Attitude (Inclination); Blood Flow; Cerebrum; Posture

20080010140 NASA Johnson Space Center, Houston, TX, USA

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight

Clement, Gilles; Denise, Pierre; Reschke, Millard; Wood, Scott J.; January 28, 2007; 21 pp.; In English; Copyright;

Avail.: Other Sources: [A03](#), Hardcopy; Abstract Only

Ocular counter-rolling (OCR) induced by whole body tilt in roll has been explored after spaceflight as an indicator of the adaptation of the otolith function to microgravity. It has been claimed that the overall pattern of OCR responses during static body tilt after spaceflight is indicative of a decreased role of the otolith function, but the results of these studies have not been consistent, mostly due to large variations in the OCR within and across individuals. By contrast with static head tilt, off-vertical axis rotation (OVAR) presents the advantage of generating a sinusoidal modulation of OCR, allowing averaged measurements over several cycles, thus improving measurement accuracy. Accordingly, OCR and the sense of roll tilt were evaluated in seven astronauts before and after spaceflight during OVAR at 45 /s in darkness at two angles of tilt (10 and 20). There was no significant difference in OCR during OVAR immediately after landing compared to preflight. However, the amplitude of the perceived roll tilt during OVAR was significantly larger immediately postflight, and then returned to control values in the following days. Since the OCR response is predominantly attributed to the shearing force exerted on the utricular macula, the absence of change in OCR postflight suggests that the peripheral otolith organs function normally after short-term spaceflight. However, the increased sense of roll tilt indicates an adaptation in the central processing of gravitational input, presumably related to a re-weighting of the internal representation of gravitational vertical as a result of adaptation to microgravity.

Author

Attitude (Inclination); Modulation; Space Flight; Rotation; Roll; Shearing

20080010616 NASA Johnson Space Center, Houston, TX, USA

Incidence of Latent Virus Shedding during Space Flight

Mehta, Satish K.; Cohrs, Randall J.; Gilden, Donald H.; Tying, Stephen K.; Ott, C. Mark; Pierson, Duane L.; February 04, 2008; 1 pp.; In English; 2008 NASA Human Research Program Investigators' Conference, 4-6 Feb. 2008, League City, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

Measurements of immune parameters of both cellular and innate immunity indicate alterations in immune function in astronauts. Immune changes are due to stress and perhaps other factors associated with launch, flight, and landing phases. Medical relevance of observed changes is not known. The reactivation of latent viruses has been identified as an important in vivo indicator of clinically relevant immune changes. The polymerase chain reaction (PCR) was used to detect the presence of specific viral DNA in body fluids. Initial studies demonstrated Epstein-Barr virus (EBV) reactivation during all 3 mission phases. EBV is shed in saliva following reactivation from B-cells. Incidence of EBV in saliva was higher than control subjects during all 3 mission phases. However, quantitative PCR revealed 10-fold higher levels of EBV DNA present in saliva collected during flight than found in pre- and post flight specimens. To determine if other latent viruses showed similar effects, cytomegalovirus (CMV), another herpes virus, shed in urine following reactivation was studied. A very low incidence (less than 2%) of CMV in urine is found in healthy, lowstressed individuals. However, 25-50% of astronauts shed CMV in their urine before, during, or after flight. Our studies are now focused on varicella-zoster virus (VZV), the etiological agent of

chicken-pox during childhood and shingles later in life. We demonstrated reactivation of VZV and shedding of the virus during and after spaceflight in saliva of astronauts with no sign of active infection or symptoms. The maximum shedding of VZV occurred during the flight phase and diminishes rapidly during the first five days after landing. We have utilized the same PCR assay for VZV in a clinical study of shingles patients. Generally, shingles patients shed much more VZV in saliva than astronauts. However, the VZV levels in astronauts overlap with the lower range of VZV numbers in shingles patients. Saliva from shingles patients and astronauts were cultured and infectious VZV was recovered from both groups. We have concluded that multiple latent viruses do reactivate before, during, and after spaceflight and serve as very sensitive indicators for diminished cellular immunity. Future plans will be focused on the clinical risks posed by the reactivation of these viruses. Initial efforts will determine the effect of longer missions on the International Space Station on the reactivation patterns of these viruses.

Author

International Space Station; Viruses; Manned Space Flight; Aerospace Medicine; Immune Systems; Life Sciences; Infectious Diseases

20080010617 NASA Johnson Space Center, Houston, TX, USA

Risks Associated with Long-Term Spaceflight

Francisco, David; Meck, Janice; February 02, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; No Copyright; Avail.: Other Sources; Abstract Only

Requirements driving the HHC work and deliverables are derived from the Human Research Program requirements, as well as Agency standards regarding the maintenance of human health and performance and a programmatic review of the existing evidence to support identified risks. Agency human health and performance standards define acceptable risk for each type and duration of exploration mission. It is critical to have the best available scientific and clinical evidence in setting and validating these standards. In addition, it is imperative that the best available evidence on preventing and mitigating human health and performance risks is incorporated into exploration mission and vehicle designs.

Author

Health; Risk; Long Duration Space Flight; Manned Space Flight

20080010618 NASA Johnson Space Center, Houston, TX, USA

Plasma Cytokine Levels in Astronauts Before and after Spaceflight

Mehta, Satish K.; Aggarwal, Barat B.; Feiveson, Alan H.; Hammond, Dinne K.; Castro, Victoria A.; Stowe, Raymond; Pierson Duane L.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

Space flight is a unique experience and results in adverse effects on human physiology. Changes have been reported in various physiological systems, including musculoskeletal, neurovestibular, cardiovascular, endocrine, immunity and increased latent viral reactivation as well as others. The potential mechanisms behind these changes are not fully understood. Various cytokines such as IL-1, IL-6, TNF and chemokines have been linked to several of these changes, like muscle loss, bone loss, fatigue, sleep deprivation and viral reactivation. Eighteen astronauts (15 M and 3 F) from 8 spaceflights and 10 healthy age-matched adults (6 M, 4 F) were included in the present study. A panel of 21 plasma cytokines was analyzed with the Lumindex 100 to measure the cytokines in these subjects 10 days before the flight (L-10), 2-3 hour after landing (R+0), 3 days after landing (R+3), and at their annual medical exam (AME). IL-10, IL-1, IFN-alpha, MCP-1 and IP-10 increased significantly at L-10 as compared with AME levels. IL-6 and IFN-alpha showed significant increases at R + 0 (P less than .05) over their baseline levels (AME). Cytokine levels at R+3 were not significantly different from R+0. IL-10 and IL-6 have been reported to increase in during viral reactivation. These data show that there was a shift from TH1 to TH2 cytokines L-10 and R+0. We also studied viral reactivation in 10 of the 18 subjects included in the present study before, during, and after space flight. Increased salivary varicella zoster virus (VZV) shedding in these subjects was found either during or after the mission. VZV shedding correlated with the increased levels of cytokines especially IL-10 and IL-6. Overall, our data suggests that cytokines may play an important role in regulating adverse changes in astronauts, and further studies are needed to fully understand the mechanism.

Author

Astronauts; Plasmas (Physics); Manned Space Flight; Cells (Biology); Physiology; Aerospace Medicine

20080010619 NASA Johnson Space Center, Houston, TX, USA

Immune Function Changes during a Spaceflight-Analog Undersea Mission

Crucian, Brian; Stowe, Raymond; Mehta, Satish; Quiniarte, Heather; Yetman, Deborah; Pierson, Duane; Sams, Clarence; February 04, 2008; 1 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

There is ample evidence to suggest that space flight leads to immune system dysregulation. This may be a result of microgravity, confinement, physiological stress, radiation, environment or other mission-associated factors. It is attractive to utilize ground-based spaceflight analogs as appropriate to investigate this phenomenon. For spaceflight-associated immune dysregulation (SAID), the authors believe the most appropriate analogs might be NEEMO (short duration, Shuttle analog), Antarctic winter-over (long-duration, ISS analog) and the Houghton Mars Project in the Canadian Arctic (intermediate-duration). Each of these analogs replicate isolation, mission-associated stress, disrupted circadian rhythms, and other aspects of flight thought to contribute to SAID. To validate NEEMO as a flight analog with respect to SAID, a pilot study was conducted during the NEEMO-12 and 13 missions during 2007. Assays were performed that assessed immune status, physiological stress and latent viral reactivation. Blood and saliva samples were collected at pre-, mid-, and post-mission timepoints.

Author

Immune Systems; Manned Space Flight; Cells (Biology); Space Missions; NASA Space Programs; International Space Station; Regulatory Mechanisms (Biology); Analogs

20080010622 NASA Johnson Space Center, Houston, TX, USA

Space Radiation Program Element

Krenek, Sam; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: [A01](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010622>

This poster presentation shows the various elements of the Space Radiation Program. It reviews the program requirements: develop and validate standards, quantify space radiation human health risks, mitigate risks through countermeasures and technologies, and treat and monitor unmitigated risks.

CASI

Extraterrestrial Radiation; NASA Programs; Health; Risk; Exobiology; Bioastronautics; Aerospace Medicine

20080010631 NASA Johnson Space Center, Houston, TX, USA; Wyle Labs., Inc., Houston, TX, USA

International Space Station Medical Project

Starkey, Blythe A.; February 04, 2008; 3 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The goals and objectives of the ISS Medical Project (ISSMP) are to: 1) Maximize the utilization the ISS and other spaceflight platforms to assess the effects of longduration spaceflight on human systems; 2) Devise and verify strategies to ensure optimal crew performance; 3) Enable development and validation of a suite of integrated physical (e.g., exercise), pharmacologic and/or nutritional countermeasures against deleterious effects of space flight that may impact mission success or crew health. The ISSMP provides planning, integration, and implementation services for Human Research Program research tasks and evaluation activities requiring access to space or related flight resources on the ISS, Shuttle, Soyuz, Progress, or other spaceflight vehicles and platforms. This includes pre- and postflight activities; 2) ISSMP services include operations and sustaining engineering for HRP flight hardware; experiment integration and operation, including individual research tasks and on-orbit validation of next generation on-orbit equipment; medical operations; procedures development and validation; and crew training tools and processes, as well as operation and sustaining engineering for the Telescience Support Center; and 3) The ISSMP integrates the HRP approved flight activity complement and interfaces with external implementing organizations, such as the ISS Payloads Office and International Partners, to accomplish the HRP's objectives. This effort is led by JSC with Baseline Data Collection support from KSC.

Derived from text

International Space Station; Aerospace Medicine; Manned Space Flight; Space Shuttles; Long Duration Space Flight

20080010634 NASA Johnson Space Center, Houston, TX, USA

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest

Platts, Steven H.; Martin, David S.; Perez, Sondar A.; Ribeiro, Christine; Stenger, Michael B.; Summers, Richard; Meck, Janice V.; [2008]; 33 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS9-97005; NIH M01 RR 0073; Copyright; Avail.: CASI: [A03](#), Hardcopy

INTRODUCTION: Orthostatic hypotension is a serious risk for crewmembers returning from spaceflight. Numerous cardiovascular mechanisms have been proposed to account for this problem, including vascular and cardiac dysfunction, which we studied during bed rest. **METHODS:** Thirteen subjects were studied before and during bed rest. Statistical analysis was limited to the first 49-60 days of bed rest, and compared to pre-bed rest data. Ultrasound data were collected on vascular and cardiac structure and function. Tilt testing was conducted for 30 minutes or until presyncopal symptoms intervened. **RESULTS:** Plasma volume was significantly reduced by day 7 of bed rest. Flow-mediated dilation in the leg was significantly increased at bed rest day 49. Arterial responses to nitroglycerin differed in the arm and leg, but did not change as a result of bed rest. Intimal-medial thickness markedly decreased at bed rest days 21, 35 and 49. Several cardiac functional parameters including isovolumic relaxation time, ejection time and myocardial performance index were significantly increased (indicating a decrease in cardiac function) during bed rest. There was a trend for decreased orthostatic tolerance following 60 days of bed rest. **DISCUSSION:** These data suggest that 6 head-down tilt bed rest alters cardiovascular structure and function in a pattern similar to short duration spaceflight. Additionally, the vascular alterations are primarily seen in the lower body, while vessels of the upper body are unaffected. **KEY WORDS:** spaceflight, orthostatic intolerance, hypotension, fluid-shift, plasma volume

Author

Physiological Responses; Cardiovascular System; Heart Function; Hemodynamic Responses; Hypotension; Space Flight; Orthostatic Tolerance; Fluid Shifts (Biology); Attitude (Inclination)

20080010658 NASA Johnson Space Center, Houston, TX, USA

The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success

Fitts, M. A.; Kerstman, E.; Butler, D. J.; Walton, M. E.; Minard, C. G.; Saile, L. G.; Toy, S.; Myers, J.; February 04, 2008; 3 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Integrated Medical Model (IMM) helps capture and use organizational knowledge across the space medicine, training, operations, engineering, and research domains. The IMM uses this domain knowledge in the context of a mission and crew profile to forecast crew health and mission success risks. The IMM is most helpful in comparing the risk of two or more mission profiles, not as a tool for predicting absolute risk. The process of building the IMM adheres to Probability Risk Assessment (PRA) techniques described in NASA Procedural Requirement (NPR) 8705.5, and uses current evidence-based information to establish a defensible position for making decisions that help ensure crew health and mission success. The IMM quantitatively describes the following input parameters: 1) medical conditions and likelihood, 2) mission duration, 3) vehicle environment, 4) crew attributes (e.g. age, sex), 5) crew activities (e.g. EVA's, Lunar excursions), 6) diagnosis and treatment protocols (e.g. medical equipment, consumables pharmaceuticals), and 7) Crew Medical Officer (CMO) training effectiveness. It is worth reiterating that the IMM uses the data sets above as inputs. Many other risk management efforts stop at determining only likelihood. The IMM is unique in that it models not only likelihood, but risk mitigations, as well as subsequent clinical outcomes based on those mitigations. Once the mathematical relationships among the above parameters are established, the IMM uses a Monte Carlo simulation technique (a random sampling of the inputs as described by their statistical distribution) to determine the probable outcomes. Because the IMM is a stochastic model (i.e. the input parameters are represented by various statistical distributions depending on the data type), when the mission is simulated 10-50,000 times with a given set of medical capabilities (risk mitigations), a prediction of the most probable outcomes can be generated. For each mission, the IMM tracks which conditions occurred and decrements the pharmaceuticals and supplies required to diagnose and treat these medical conditions. If supplies are depleted, then the medical condition goes untreated, and crew and mission risk increase. The IMM currently models approximately 30 medical conditions. By the end of FY2008, the IMM will be modeling over 100 medical conditions, approximately 60 of which have been recorded to have occurred during short and long space missions.

Author

Aerospace Medicine; Health; Mission Planning; Risk; Spacecrews; Operations Research; Manned Space Flight

20080010659 NASA Johnson Space Center, Houston, TX, USA

Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and ‘Braslet-M’ Occlusion Cuffs

Bogomolov, V. V.; Duncan, J. M.; Alferova, I. V.; Dulchavsky, S. A.; Ebert, D.; Hamilton, D. R.; Matveev, V. P.; Sargsyan, A. E.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators’ Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Recent advances in remotely guided imaging techniques on ISS allow the acquisition of high quality ultrasound data using crewmember operators with no medical background and minimal training. However, ongoing efforts are required to develop and validate methodology for complex imaging protocols to ensure their repeatability, efficiency, and suitability for use aboard the ISS. This Station Developmental Test Objective (SDTO) tests a cardiovascular evaluation methodology that takes advantage of the ISS Ultrasound capability, the Braslet-M device, and modified respiratory maneuvers (Valsalva and Mueller), to broaden the spectrum of anatomical and functional information on human cardiovascular system during long-duration space missions. The proposed methodology optimizes and combines new and previously demonstrated methods, and is expected to benefit medically indicated assessments, operational research protocols, and data collections for science. Braslet-M is a current Russian operational countermeasure that compresses the upper thigh to impede the venous return from lower extremities. The goal of the SDTO is to establish and validate a repeatable ultrasound-based methodology for the assessment of a number of cardiovascular criteria in microgravity. Braslet-M device is used as a means to acutely alter volume distribution while focused ultrasound measurements are performed. Modified respiratory maneuvers are done upon volume manipulations to record commensurate changes in anatomical and functional parameters. The overall cardiovascular effects of the Braslet-M device are not completely understood, and although not a primary objective of this SDTO, this effort will provide pilot data regarding the suitability of Braslet-M for its intended purpose, effects, and the indications for its use.

Derived from text

Cardiovascular System; Heart Function; Imaging Techniques; Long Duration Space Flight; Ultrasonics; Aerospace Medicine; Coronary Circulation

20080010663 NASA Johnson Space Center, Houston, TX, USA

Mission Medical Information System

Johnson-Throop, Kathy A.; Joe, John C.; Follansbee, Nicole M.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators’ Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

This viewgraph presentation gives an overview of the Mission Medical Information System (MMIS). The topics include: 1) What is MMIS?; 2) MMIS Goals; 3) Terrestrial Health Information Technology Vision; 4) NASA Health Information Technology Needs; 5) Mission Medical Information System Components; 6) Electronic Medical Record; 7) Longitudinal Study of Astronaut Health (LSAH); 8) Methods; and 9) Data Submission Agreement (example).

Derived from text

Information Systems; Clinical Medicine; Technology Utilization; Aerospace Medicine

20080010666 NASA Johnson Space Center, Houston, TX, USA; Wyle Labs., Inc., Houston, TX, USA

Human Research Program Requirements Document

Rieger, Gabe; July 2007; 24 pp.; In English

Report No.(s): HRP-47052-Revision A; Copyright; Avail.: CASI: [A03](#), Hardcopy

The purpose of this document is to define, document, and allocate the Human Research Program (HRP) requirements to the HRP Program elements. It establishes the flow-down of requirements from Exploration Systems Mission Directorate (ESMD) and Office of the Chief Health and Medical Officer (OCHMO) to the various Program Elements of the HRP to ensure that human research and technology countermeasure investments are made to insure the delivery of countermeasures and technologies that satisfy ESMD s and OCHMO’s exploration mission requirements.

Author

Human Factors Engineering; Human Performance; Research and Development; Aerospace Medicine; Habitability; Space Flight Stress

20080010817 Institute of Space Medico-Engineering, Beijing, China

Space Medicine and Medical Engineering, Volume 20, No. 5

Wang, Xi-ji, Editor; Yu, Meng-sun, Editor; Qi, Fa-ren, Editor; Wei, Jin-he, Editor; Chen, Shan-guang, Editor; Wang, Xian-min, Editor; Bai, Jing, Editor; Bai, Yan-qiang, Editor; Sun, Xi-qing, Editor; Hong, Feng, Editor, et al.; October 2007; ISSN 1002-0837; 84 pp.; In Chinese; In English; See also 20080010818 - 20080010834; Original contains black and white illustrations

Report No.(s): CN11-2774/R; Copyright; Avail.: Other Sources

The following areas are addressed in this journal issue: effects of psoralen on ADR multidrug resistance and CA2+ concentration; an analysis and comparative study on characteristics of competent astronauts; the effects of simulated weightlessness on the induction of ERK2 by fluid shear stress in MG-63 osteosarcoma cell; the effects of simulated microgravity on the morphology and growth of neurons; an observation on cardiovascular damage in pilots after repeated +Gz exposures; the study of biomechanical properties of human cervical and lumbar vertebral segments; the development of a space ethylene filter prototype facility for use in ground-based experiments; the kinetics of reaction between LiOH - H₂O and CO₂; the effects of uniaxial stretch on expressions of collagens Type 1 and Type III in rat bone mesenchymal stem cells; the influence of circadian rhythm gene clock on the fertility of male mice; the recellularization in vitro of blood vessel scaffold based on decellularized canine aorta; an analysis of relation between changes of pupil and mental workloads; the dynamic changes of ultrastructure and elements of otoconia during repair and regeneration process in guinea pigs; a method and instrument for ECG measurement based on two electrodes; and the calculation of the electric field and potential distributions of six needle electrodes in conductive media (biological tissues) by integral equation approach. Additionally, a brief report regarding the real-time detection of binocular rivalry through electroencephalogram and a literature review regarding the progress and countermeasure of effect of space flight environment factors on learning and memory are included.

Derived from text

Aerospace Medicine; Astronauts; Physiological Responses; Gravitational Physiology; Gravitational Effects; Space Flight

20080010818 China Astronaut Research and Training Center, Beijing, China

Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments

Liu, Bing-kun; Ma, Hong-lei; Jiang, Shi-zhong; Tang, Lei; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 336-338; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objectives of this study are to obtain the biomechanical parameters of cervical and lumbar vertebral segments and to provide useful information for the evaluation of human spine safety in mechanical environments and protection design. Methods Compressive tests were conducted on 6 human cervical vertebral segments and 4 human lumbar vertebral segments using MTS, and the curves of compressive load versus deflection were obtained. On the basis of analysis, yield compressive load, yield deflection and stiffness were presented. Results For cervical vertebral segments, the mean yield compressive load, yield deflection and stiffness were 2 267 N, 12.6 mm and 303.07 N/mm respectively. For lumbar vertebral segments, the mean yield compressive load, yield deflection and stiffness were 5 276 N, 13.25 mm and 633.52 N/mm respectively. Conclusion The mean yield compressive load for lumbar vertebral segment is more than twice that of cervical vertebral segment, but their mean yield deflections are almost equal

Author (revised)

Biodynamics; Compression Loads; Spine

20080010819 Institute of Space Medico-Engineering, Beijing, China

A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram

Lin, Zhong-lin; Zhang, Ya-jing; Gao, Xiao-rong; Zhang, Chang-shui; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 3810384; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Objective: To propose a new approach for real-time detection of binocular rivalry through electroencephalogram (EEG). Methods: The subjects were required to gaze at two separate images, flickering at slightly different frequencies, with one of his/her eyes, on one image and the other eye on the other image. The perception will alternate between the two images voluntarily (binocular rivalry). At the same time, steady-state visual evoked potentials with the same frequency of the flickering images will emerge. Using a segment of multichannel EEG signals, two template models were trained to capture the EEG characteristic at the time of perception alternation. Then, the templates were moved on the whole length of the EEG signal to find out other time points of perception alternation. Results: The objectively detected result by our proposed method can match the subjective reports better than currently used method based on power spectral analysis. Conclusion: This model

based detection method using multichannel signals and harmonic information is more robust than the currently used method based on power spectral analysis.

Author

Correlation; Binocular Vision; Electroencephalography; Real Time Operation; Bioelectric Potential

20080010821 Liaoning Univ., China

Effects of Psoralen on ADR Multidrug Resistance and Ca²⁺(+) Concentration in MCF-7/ADR Cells

Cai, Tian-ge; Cai, Yu; Yu, Shao-lei; Feng, Xiao-zhen; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 313-316; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Objective: To research the reversal effects of psoralen on multidrug resistant action and its influence on intracellular Ca²⁺(+) concentration in MCF-7/ADR cells and to explore its possible mechanisms of reversing multidrug resistance (MDR). Methods: The inhibitory effects of psoralen on the viability of MCF-7/ADR cells were determined with MTT assay, intracellular adriamycin (ADR) concentration was assayed with HPLC and the intracellular Ca²⁺(+) concentrations in different incubative duration were detected with confocal microscope. Results: Psoralen from 1 to 20 micro-mol/L reduced the value of IC₅₀ of ADR in MCF-7/ADR cells, enhanced accumulation of ADR and influenced Ca²⁺(+) concentration with a negative correlation in different duration (24 h, 48 h and 96 h). Conclusion: Psoralen can reverse MDR in MCF-7/ADR cells and its mechanism may be related to the increase of the intracellular accumulation of ADR by enhancing the intracellular Ca²⁺(+) concentration. Key Words: psoralen ; multidrug resistance ; reverse ; MCF-7/ADR cells

Author

Liquid Chromatography; Antibiotics; Assaying

20080010822 China Astronaut Research and Training Center, Beijing, China

Analysis and Comparative Study on Characteristics of Competent Astronauts

Jing, Xiao-lu; Liu, Fang; Wu, Bin; Miao, Dan-min; Bai, Yan-qiang; Yan, Fu-lin; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 317-322; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

To establish the procedures and contents of psychological selection of astronauts basing on studies of distinctions of psychological qualities of different sexes in different positions. Talked semi-structured interview for 96 person-times with related people including active astronauts, astronaut tutors who have worked over 6 years, psychological experts in spaceflight mission and psychological experts for selection of aircraft pilots. There are 19 items of necessary mental characteristics which are common in pilot astronaut, flight engineers, payload specialists and female astronauts. As for astronauts in special positions, special items are needed according to distinctive characteristics of the duties. The psychological selection procedures of astronauts should include both common items and distinctive items demanded for special positions.

Author

Astronauts; Psychology; Aerospace Medicine; Characteristics

20080010823 Beijing Inst. of Graphic Communication, Beijing, China

Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach

Liu, Fu-ping; Wang, An-ling; Wang, An-xuan; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 376-380; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Objective To calculate the electric field and potential distribution of multi-needle electrodes in conductive media (biological tissues) by integral equation approach. Methods According to the electric potentials of multi-needle electrodes, discrete equations based on unknown linear current density were established by using boundary element integral equations. Non-uniform distribution of current flows from the needle electrode to the conductive media was calculated by solving the linear equation group. Electric fields and potentials at various points in the media were calculated using the linear current density. Results Numerical calculation of the potential distribution of six-needle electrodes was realized in conductive media by boundary element approach. The results of numerical calculation were in excellent agreement with measured experimental results. Conclusion This method is effective and accurate and can be used for calculating the electric field and potential distribution of multi-needle electrodes in biological tissues.

Author

Electrodes; Needles; Electric Fields; Boundary Element Method; Current Density

20080010824 Air Force General Hospital, Beijing, China

Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures

Zheng, Jun; Liu, Cheng-gang; Wang, Lu-jin; Cui, Li; Xu, Shu-xuan; Fu, Zhao-jun; Liu, Jing; Xu, Xian-rong; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 332-335; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

To observe the effect of repeated + Gz exposure on cardiovascular system in pilots. The centrifuge testing of + Gz tolerance was performed in 94 fighter pilots. The maximum + Gz exposure was +4.25 ~ 4.5 Gz/10 s or +7.0 Gz/10 s. Left ventricular pump function indices, cardiac troponin T (cTnT), myocardial enzymes (AST, LDH, alpha-HBD, CK and CK-MB) and high-sensitivity C-reactive protein (hs-CRP) were measured before and after + Gz exposure. Results Cardiac function indices and myocardial enzymes after + Gz exposure did not change significantly as compared with the control values before + Gz exposure (P greater than 0.05). Blood cTnT level was lower than 0.05 ng/mL after + Gz exposure. Blood hs-CRP level had a slight increase, from (0.16 plus or minus 0.41) mg/L to (0.46 10.62) mg/L after +4.25 -4.5 Gz/10 s exposure and from (0.38 10.56) mg/L to (1.08 10.70) mg/L after +7.0 Gz/10 s exposure (all P less than 0.05), and the difference was very significant between +4.25 ~ 4.5 Gz/10 s exposure and + 7.0 Gz/10 s exposure (P less than 0.01). Repeated + Gz exposure under 7 G has no significant harmful effect on cardiac function and myocardium in pilots, but further studies if repeated + Gz exposure may affect cardiovascular atherosclerosis process through provoking nonspecific inflammatory reaction are still needed.

Author

Cardiovascular System; Heart Function; Radiation Damage; Radiation Dosage; Aerospace Medicine; Aircraft Pilots

20080010825 Tsinghua Univ., Beijing, China

Method and Instrument for ECG Measurement Based on Two Electrodes

Hao, Hong-wei; Ma, Bo-zhi; Li, Lu-ming; Cao, Yang; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 372-375; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

To develop the method and miniaturized low-power-consumption instrument for electrocardiogram (ECG) measurement based on two electrodes. Structure of the ECG instrument and mechanism of common-mode interference were analyzed, and the miniature low power consumption ECG measuring circuit was designed using microprocessor, instrumentation amplifier, operational amplifier and RS-232 transceiver. PDA powered the measuring circuit, then received, calculated, stored and displayed the measurement data. The developed ECG instrument fulfills the requirements of ECG measurement, and the size of the circuit was only 4.0 cm x 1.5 cm, power consumption was only 15 mW (including communication circuit) or 3 mW (without communication circuit). The method and instrument based on two electrodes developed in this work, can be used in implantable, wearable or portable ECG measurements.

Author

Electrocardiography; Electrodes; Miniaturization; Measuring Instruments; Electrical Engineering

20080010826 Institute of Space Medico-Engineering, Beijing, China

Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells

Wu, Yan-hong; Wang, Bing; Cao, Xin-sheng; Yang, Zhi; Zhang, Shu; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 323-326; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objectives of this study are to understand the effect of simulated weightlessness on the osteoblastic mechano-signal transduction with the level of signal transduction, to explore the relationship between Shc and ERK2 in the mechanotransduction of MG-63 osteosarcoma cells, and to survey the effect of simulated weightlessness on the induction of flow shear stress (FSS) to the activation of ERK2 in MG-63 osteosarcoma cells. Methods The MG-63 osteosarcoma cells of one group were co-transfected with negative mutant of Shc (Shc-SH2) and Myc-ERK2. Another group cells were co-transfected with pcDNA3 parental vector together and Myc-ERK2 as control group. Cells of both groups were treated by 1.5 Pa FSS and no FSS for 15 min. The effect of FSS on the activation of Myc-ERK2 was examined. The control group cells were cultured for 60 h in 2 different gravitational conditions, 1 G and simulated weightlessness with clinostat. Then, 1.5 Pa FSS and no FSS were set to the cells of two gravitational conditions for 15 min. Results In 1 G terrestrial gravitational condition, FSS caused significantly activating Myc-ERK2 in cells transfected with pcDNA3, and this FSS induction to Myc-ERK2 activity was drastically reduced in cells transfected with Shc-SH2 (P < 0.05). There was no measurable value in the amount of Myc-ERK2 activities in MG-63 cells without FSS treatment. After the MG-63 cells of control group, transfected with pcDNA3 and Myc-ERK2, were cultured in simulated weightlessness condition with clinostat for 60 h and were treated with mechanical stimulation, 1.5 Pa FSS for 15 min, the activity of Myc-ERK2 was increased, but it was significantly decreased as compared with cultured in 1 G, terrestrial gravitational condition (P ~ 0.05). Conclusion It is suggested that

in the pathway of signal transduction Shc may be involved in the upstream signaling for the flow shear stress induction to activate ERK2, and simulated weightlessness condition has an adverse effect on mechanotransduction in MG-63 cells.

Author (revised)

Shear Stress; Weightlessness Simulation; Cancer; Bones

20080010827 Institute of Space Medico-Engineering, Beijing, China

Effects of Simulated Microgravity on the Morphology and Growth of Neurons

Ji, Yu-huan; Li, Hu-lun; Wang, Dan-dan; Sun, Bo; Mu, Li-li; Lv, Gui-xiang; Jin, Lian-hong; Wang, Jing-hua; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 327-331; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objectives of this work were to observe and study the influence of simulated microgravity on the morphology, ultrastructure and growth of neurons. Methods Primary neurons were separated from the neonatal rats and seeded on Cytodex3 micro-carriers and then moved into rotary cell culture system after 3 d cultivation. The longitudes of axons were measured by the software of Image-Pro Plus. The changes of ultrastructure were observed with transmission electron-microscope. Results The longitudes of axons of neurons under the condition of stimulated microgravity for 5 d were significantly longer than those under the normal condition [(65.34 +/- 8.38) micron VS. (56.10 +/- 8.57) micron, $P < 0.01$], and were significantly longer than its original length after the interchange of supernatant fluid under the condition of simulated microgravity and that under the normal condition [(60.91 +/- 5.04) micron vs. (65.67 +/- 5.61) micron, $P < 0.01$; (54.65 +/- 5.49) micron vs. (60.89 +/- 6.29) micron, $P < 0.01$]. To be detected by transmission electron microscope, there were mainly mature cells in the neurons cultured with 5 d. The peculiarities of mature cells ultrastructure were characterized by centre dilated perinuclear space, ditissimus cell organelles in the cytoplasm and many glycogenosomes were determined. Conclusion Simulated microgravity can irreversibly affect the longitude of axon and the ultrastructure of neurons, and causes the changes of the constituents in culture medium, which can affect the longitude of neurons axon.

Author

Cultivation; Microgravity; Neurons; Physiological Effects; Gravitational Physiology; Cells (Biology); Growth

20080010828 BeiHang Univ., Beijing, China

An Analysis of Relation between Changes of Pupil and Mental Workloads

Kang, Wei-yong; Yuan, Xiu-gan; Liu, Zhong-qi; Dong, Da-yong; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 364-366; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Objective: To evaluate mental workload by changes of the subjects' pupil area during their performances of variable difficulty missions. Methods: Ten subjects executed missions of variable difficulty vision search tasks, their pupil areas were measured with and noted with an eye movement measuring system. Changes of pupil area under different mental workloads were analyzed to understand the pertinency of pupil and mental workload. Results: The changes of pupil area among subjects had two same orderliness and three different diversities. The diversities were the appearance of pupil expanding on the different difficulty grade tasks. Conclusion: In the same working environment, the changes of pupil area can evaluate the difference of mental workload: pupil will dwindle with the increase of working difficulty, it will expand with the augment of tensity; pupils will dwindle during certain degree of fatigue. Key words: ergonomics ; pupil ; mental workload ; eye movement measuring system ; fatigue

Author

Eye Movements; Pupils; Mental Performance; Human Factors Engineering

20080010829 Beijing Union Univ., Beijing, China

Kinetics of Reaction between LiOH - H₂O and CO₂

Zhao, Zhuo; Fu, Ping-feng; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 344-348; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Objective: To study kinetics of reaction between LiOH-H₂O and CO₂ in a closed reaction system. Methods: Under the conditions of reaction temperatures of 273 to approx. 323 K and initial CO₂ pressures of 40 kPa to approx. 100 kPa, kinetics of reaction between LiOH-H₂O and CO₂ was studied using Erofeev's equation. Results: The conversion rate of LiOH-H₂O decreased slightly with reduction of initial CO₂ pressure. When reaction temperature was lower than 299 K, the carbonization rate was low and almost independent of the reaction temperatures. However, as the reaction temperature rose up to 300 to approx. 323 K, dehydration of crystal water from the hydrated lithium hydroxide began, and both the hydrated water and the reaction generated water were evaporated and disengaged from the solid reactant. The conversion rate also increased because

the dehydration rate of LiOH-H₂O increased with the rise of the reaction temperature. When the reaction temperature was higher than 323 K, the reaction kinetics of LiOH-H₂O was similar to that of anhydrous LiOH, and the reaction was kept at a high conversion rate. Conclusion: The conversion rate of LiOH-H₂O increases remarkably with the increase of reaction temperature. The reaction kinetics of LiOH-H₂O with CO₂ obey the Erofeev's Equation.

Author

Carbon Dioxide; Lithium Hydroxides; Reaction Kinetics; Dehydration; Carbonization

20080010830 Institute of Aviation Medicine, Beijing, China

Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs

Jia, Hong-bo; Xie, Su-jiang; Guo, Shi-jun; Tian, Da-wei; Bi, Hong-zhe; Wang, Shan-xiang; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 367-371; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objective is to observe the ultrastructure and elements characteristics of the mature otoconia during their repair and regeneration process after damage, and to explore its mechanisms. The otoconia of 18 guinea pigs were damaged by a high G force (10 Gy 5 min), and their utricle macula were observed by scanning electron microscopy (SEM) at 1 h, 2 d and 8 d after the damage respectively. The elements of different kinds of otoconia were measured qualitatively and quantitatively by electron probe X-ray microanalysis (EPMA). One hour after G exposure, absence of the otoconia and presence of their precursor-globular substances were found, 2 d after exposure, those globular substances showed some kind of calcification, and 8 d after exposure, coexistence of globular substances with small dumb-bell shaped otoconia were observed. Different kinds of degeneration of otoconia were found in all phases after high G exposure. It was found that Ca concentration in the degenerated otoconia was significantly higher than that in other kinds of otoconia, while P was lower. Ca concentration in the primary global substances was lower and P was higher than those in the calcificated ones, but statistics showed no significant difference. Matured otoconia can repair and regenerate after damage, and changes of both ultrastructure and elements are involved during the process.

Author (revised)

Ear; Aerospace Medicine; Guinea Pigs; Calcification

20080010831 China Astronaut Research and Training Center, Beijing, China

Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function

Fan, Quan-chun; Li, Yong-zhi; Liu, Xin-min; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 385-390; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

Health and good performance of astronauts have an intimate connection with the function status of the brain during space flight. Studies of learning and memory during space flight in recent years were described. The effects of simulated weightlessness, noise or overweight on learning and memory were summarized, and preventive measures were put forward.

Author

Aerospace Environments; Learning; Memory; Weightlessness; Astronaut Performance

20080010832 Institute of Space Medico-Engineering, Beijing, China

Effects of Uniaxial Stretch on Expressions of Collagens Type I and Type II in Rat Bone Mesenchymal Stem Cells

Zhang, Lei; Wang, Xiong; Tran, Nguyen; Chen, Huai-qing; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 349-353; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objective of this work is to study the effect of mechanical stimuli on the differentiation of bone marrow mesenchymal stem cells (BMSCs). A cyclic 10% uniaxial strain at 1 Hz was applied on rat BMSCs for different durations. The mRNA expressions and the proteins of collagens type I and type III in the BMSCs were measured with real time RT-PCR and radioimmunoassay. Compared with their corresponding control groups, the mRNA expressions of type I and type III collagens were enhanced after stretched for 12 h. Whilst, there was a statistic difference in protein synthesis of these two types of collagens after stretched for 24 h. The mechanical stretch promotes the protein synthesis of type I and type II collagens in the rat BMSCs

Author

Axial Strain; Bone Marrow; Collagens; Stem Cells

20080010834 Institute of Space Medico-Engineering, Beijing, China

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta

Tu, Qiu-fen; Zhang, Yi; Wu, Jiang; Ge, Dong-xia; Li, Yan; Chen, Huai-qing; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 358-363; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objective of this study was to recellularize a novel tissue engineered blood vessel (TEBV) scaffold based on decellularized canine aorta which we had successfully constructed. Canine aortas were decellularized under the co-action of EX-810, ion-free water, and ultrasound. Then this kind of scaffolds was recellularized in vitro, including the seeding of smooth muscle cells (SMC), seeding of endothelial cells (EC), and dual seeding of these two kinds of cells. Results The TEBV scaffolds we had constructed were suitable for SMC and EC to grow on; a nearly confluent layer of either SMC or EC could be achieved when seeded in proper density. The recellularization process was accelerated by increasing the seeding density. In the dual seeding system, EC could grow well directly on the layer of SMC with different seeding density, while the morphology and covering rate of EC were influenced by the density of their co-culture SMC. Conclusion SMC and EC can be successfully seeded on the decellularized canine aortas separately or unitedly.

Author

Blood Vessels; Growth; Tissue Engineering; Cells (Biology); Heart

20080010875 NASA Johnson Space Center, Houston, TX, USA; Wyle Labs., Inc., Houston, TX, USA

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension

Stenger, Michael B.; Stein, Sydney P.; Meck, Janice V.; Platts, Steven H.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

One possible mechanism for post-spaceflight orthostatic hypotension, which affects approximately 30% of astronauts after short duration shuttle missions, is inadequate norepinephrine release during upright posture. We performed a two phased study to determine the effectiveness of an alpha1-adrenergic agonist, midodrine, as a countermeasure to post-spaceflight orthostatic hypotension. The first phase of the study examined the landing day orthostatic responses of six veteran astronauts after oral midodrine (10 mg) administered on the ground within approximately two hours of wheel stop. One female crewmember exhibited orthostatic hypotension in a previous flight but not after midodrine. Five male crewmembers, who did not exhibit orthostatic hypotension during previous flights, also did not show signs of orthostatic hypotension after midodrine. Additionally, phase one showed that midodrine did not cause hypertension in these crewmembers. In the second phase of this study, midodrine is ingested inflight (near time of ignition, TIG) and orthostatic responses are determined immediately upon landing via an 80 degree head-up tilt test performed on the crew transport vehicle (CTV). Four of ten crewmembers have completed phase two of this study. Two crewmembers completed the landing day tilt tests, while two tests were ended early due to presyncopal symptoms. All subjects had decreased landing day stroke volumes and increased heart rates compared to preflight. Midodrine appears to have increased total peripheral resistance in one crewmember who was able to complete the landing day tilt test. The effectiveness of midodrine as a countermeasure to immediate post-spaceflight orthostatic hypotension has yet to be determined; interpretation is made more difficult due to low subject number and the lack of control subjects on the CTV.

Author

Countermeasures; Hypotension; Norepinephrine; Astronauts; Pharmacology; Aerospace Medicine; Drugs

20080010876 NASA Johnson Space Center, Houston, TX, USA

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function

Platts, Steven H.; Stenger, Michael B.; Martin, David S.; Freeman-Perez, Sondra A.; Phillips, Tiffany; Ribeiro, L. Christine; February 04, 2008; 2 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Orthostatic intolerance is a recognized consequence of spaceflight. Numerous studies have shown that women are more susceptible to orthostatic intolerance following spaceflight as well as bed rest, the most commonly used ground-based analog for spaceflight. One of the possible mechanisms proposed to account for this is a difference in vascular responsiveness between genders. We hypothesized that women and men would have differing vascular responses to 90 days of 6-degree head down tilt bed rest. Additionally, we hypothesized that vessels in the upper and lower body would respond differently, as has been shown in the animal literature. Thirteen subjects were placed in bedrest for 90 days (8 men, 5 women) at the Flight Analogs Unit, UTMB. Direct arterial and venous measurements were made with ultrasound to evaluate changes in vascular structure and function. Arterial function was assessed, in the arm and leg, during a reactive hyperemia protocol and during sublingual nitroglycerin administration to gauge the contributions of endothelial dependent and independent dilator function respectively.

Venous function was assessed in dorsal hand and foot veins during the administration of pharmaceuticals to assess constrictor and dilator function. Both gender and day effects are seen in arterial dilator function to reactive hyperemia, but none are seen with nitroglycerin. There are also differences in the wall thickness in the arm vs the leg during bed rest, which return toward pre-bed rest levels by day 90. More subjects are required, especially females as there is not sufficient power to properly analyze venous function. Day 90 data are most underpowered.

Author

Bed Rest; Head Down Tilt; Hemodynamic Responses; Ultrasonics; Cardiovascular System; Females; Males

20080010877 NASA Johnson Space Center, Houston, TX, USA

International Space Station Medical Operations

Jones, Jeffrey A.; [2008]; 4 pp.; In English; Original contains color illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010877>

NASA is currently the leader, in conjunction with our Russian counterpart co-leads, of the Multilateral Medical Policy Board (MMPB), the Multilateral Medical Operations Panel (MMOP), which coordinates medical system support for International Space Station (ISS) crews, and the Multilateral Space Medicine Board (MSMB), which medically certifies all crewmembers for space flight on-board the ISS. These three organizations have representatives from NASA, RSA-IMBP (Russian Space Agency- Institute for Biomedical Problems), GCTC (Gagarin Cosmonaut Training Center), ESA (European Space Agency), JAXA (Japanese Space Agency), and CSA (Canadian Space Agency). The policy and strategic coordination of ISS medical operations occurs at this level, and includes interactions with MMOP working groups in Radiation Health, Countermeasures, Extra Vehicular Activity (EVA), Informatics, Environmental Health, Behavioral Health and Performance, Nutrition, Clinical Medicine, Standards, Post-flight Activities and Rehabilitation, and Training. Each ISS Expedition has a lead Crew Surgeon from NASA and a Russian Crew Surgeon from GCTC assigned to the mission. Day-to-day issues are worked real-time by the flight surgeons and biomedical engineers (also called the Integrated Medical Group) on consoles at the MCC (Mission Control Center) in Houston and the TsUP (Center for Flight Control) in Moscow/Korolev. In the future, this may also include mission control centers in Europe and Japan, when their modules are added onto the ISS. Private medical conferences (PMCs) are conducted regularly and upon crew request with the ISS crew via private audio and video communication links from the biomedical MPSR (multipurpose support room) at MCC Houston. When issues arise in the day-to-day medical support of ISS crews, they are discussed and resolved at the SMOT (space medical operations team) meetings, which occur weekly among the International Partners. Any medical or life science issue that is not resolved at the SMOT can be taken to the Mission Management Team meeting, which occurs biweekly from MCC-Houston. This meeting includes the other International Partners and all flight support and console position representatives via teleconference. ISS Crew Surgeons have handled many medical conditions on orbit; including skin rashes, dental abscesses, lacerations, and STT segment EKG changes. Fortunately to date, there have not been any forced medical evacuations from the ISS. This speaks well for the implementation of the primary, secondary and even tertiary prevention strategies invoked by the Integrated Medical Group, as there were several medical evacuations during the previous Russian space stations.

Author

International Space Station; Aerospace Medicine; Clinical Medicine; Flight Surgeons; Medical Science; Nutrition; Health; Medical Personnel

20080010878 NASA Johnson Space Center, Houston, TX, USA

Changes in Calcium Metabolism during Space Flight

Smith, Scott M.; Zwart, Sara R.; [2008]; 6 pp.; In English; Copyright; Avail.: Other Sources

Calcium is critical for maintaining the body's structural and mechanical functions, and it makes up 37% to 40% of the bone mineral hydroxyapatite in the body. Total skeletal calcium is on average 1100 to 1500 g, and inadequate calcium intake has significant impact on adult bone. About 1% of the body's calcium stores resides in the intracellular structures, cell membranes, and extracellular fluids. In addition to its obvious role in the musculoskeletal system, calcium has a critical role in modulating the function of important proteins and regulation of metabolic processes. Calcium binding is responsible for the activation of a wide range of proteins, including those involved in cell motility, blood coagulation, muscle contraction, neural transmission, glandular secretion, and cell division. Circulating calcium levels are under tight control and are maintained within a narrow range.

Derived from text

Calcium Metabolism; Manned Space Flight; Aerospace Medicine; Musculoskeletal System

20080010880 Centre National de la Recherche Scientifique, Toulouse, France; NASA Johnson Space Center, Houston, TX, USA

Neuroscience in Space

Clement, Gilles; Reschke, Millard F.; February 15, 2008; 328 pp.; In English; Copyright; Avail.: Other Sources

Significant changes take place in the central nervous systems of astronauts during and following exposure to microgravity. Space travelers are transported in vehicles that move in three-dimensional space and generate inertial forces that create environmental factors to which they are not accustomed, either by evolution or experience. The responses of the vestibular organs in the inner ear, as well the kinesthetic, pressure and touch receptors, may be altered by hyper- or hypogravity. These altered responses to inertial stimulation outside their normal physiological range, or, even within this range, signal appropriately for the force environment, but inappropriately for the other sensory systems. These changes can modify situational awareness, induce spatial disorientation, result in illusions of self-motion, trigger dizziness and vertigo, and bring about motion sickness. However, the plasticity of the central nervous system allows individuals to adapt to these altered sensory stimulus conditions, and after a few days in space the symptoms disappear. The price paid for this in-flight adaptation (what has become known as space normal) is a deconditioning of antigravity responses necessary for effective living following a return to Earth or landing on Mars. The duration of these altered responses is function of the time spent in space. In order to minimize the impact of adaptation to microgravity on crew health and performance following long-duration space flight, effective countermeasures must be developed. Our intent and purpose of compiling this historical overview of neuroscience and its role in space flight serves two purposes. The first is to equip researchers with a single reference document compiling a representation of those neuroscience experiments that have been flown in space. The second is to highlight the accomplishments of many scientists who have contributed to the history of space neuroscience. It is our hope that insights generated by reading this book will greatly contribute to the future agenda of space neuroscience.

Derived from text

Aerospace Medicine; Central Nervous System; Countermeasures; Microgravity; Neurology; Physiological Effects; Bioastronautics; Gravitational Physiology

20080010881 NASA Johnson Space Center, Houston, TX, USA

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma

Wang, Zuwei; Vaksman, Zalman; Putcha, Lakshmi; [2008]; 1 pp.; In English; AAPS 2008 National Biotechnology Conference, 22-25 Jun. 2008, Toronto, Canada; Copyright; Avail.: Other Sources; Abstract Only

Intranasal scopolamine is a choice drug for the treatment of motion sickness during space flight because of its quick onset of action, short half-life and favorable sideeffects profile. The dose administered usually ranges between 0.1 and 0.4 mg. Such small doses make it difficult to detect concentrations of scopolamine in biological fluids using existing sensitive LC/MS/MS method, especially when the biological sample volumes are limited. To measure scopolamine in human plasma to facilitate pharmacokinetic evaluation of the drug, we developed a sensitive LC/MS/MS method using 96 well micro elution plates for solid phase extraction (SPE) of scopolamine in human plasma. Human plasma (100-250 micro L) were loaded onto Waters Oasis HLB 96 well micro elution plate and eluted with 50 L of organic solvent without evaporation and reconstitution. HPLC separation of the eluted sample was performed using an Agilent Zorbax SB-CN column (50 x 2.1 mm) at a flow rate of 0.2 mL/min for 3 minutes. The mobile phase for separation was 80:20 (v/v) methanol: ammonium acetate (30 mM) in water. Concentrations of scopolamine were determined using a Micromass Quattro Micro(TM) mass spectrometer with electrospray ionization (ESI). ESI mass spectra were acquired in positive ion mode with multiple reaction monitoring for the determination of scopolamine $m/z = 304.2$ right arrow 138.1 and internal standard hyoscyamine $m/z = 290.2$ right arrow 124.1. The method is rapid, reproducible, specific and has the following parameters: scopolamine and the IS are eluted at about 1.1 and 1.7 min respectively. The linear range is 25-10000 pg/mL for scopolamine in human plasma with correlation coefficients greater than 0.99 and CV less than 0.5%. The intra-day and inter-day CVs are less than 15% for quality control samples with concentrations of 75,300, and 750 pg/mL of scopolamine in human plasma. SPE using 96 well micro elution plates allows rapid sample preparation and enhanced sensitivity for the LC/MS/MS determination of scopolamine in a small volume of biological samples. The new method is also cost effective since it uses a small volume of organic solvents compared to the methods using SPE cartridges or regular 96 well SPE plates. This method can be successfully used for bioavailability and pharmacokinetic evaluations of scopolamine, especially when volumes of biological samples are limited. Further investigation to use automated SPE system with 96 well micro elution plates is planned.

Author

Liquid Chromatography; Mass Spectra; Mass Spectrometers; Pharmacology; Sensitivity; Hyoscyine; Blood Plasma

20080010885 NASA Johnson Space Center, Houston, TX, USA

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons

Hada, M.; George, Kerry A.; Cucinotta, F. A.; [2008]; 2 pp.; In English; 37th COSPAR Scientific Assembly, 13-20 Jul. 2008, Montreal, Canada; Copyright; Avail.: Other Sources; Abstract Only

During space flight, astronauts are exposed to a space radiation consisting of high-energy protons, high charge and energy (HZE) nuclei, as well as secondary particles that are generated when the primary particles penetrate the spacecraft shielding. Secondary particles have a higher LET value than primary protons and therefore expected to have a higher relative biological effectiveness (RBE). To investigate this theory, we exposed human peripheral blood lymphocytes to protons with energies of 250 MeV, 800MeV, 2 GeV, or 2.5 GeV. LET values for these protons ranged from 0.4 to 0.2 keV/micrometer. and doses ranged from 0.2 to 3 Gy. Over this energy the probability of nuclear reaction leading to secondary radiation, and the multiplicity of reaction produces such as neutrons and mesons increases substantially. The effect of aluminum and polyethylene shielding was also assessed using the 2 GeV and 2.5GeV proton beams. After exposure lymphocytes were stimulated to divide and chromosomes were collected from cells in the first G2 and metaphase cell cycle after exposure using a chemical induced premature chromosome condensation (PCC) technique. Dose response data for chromosome damage was analyzed using the fluorescence in situ hybridization (FISH) chromosome painting technique. Selected samples were also analyzed with multicolor FISH (mFISH) and multicolor banding FISH (mBAND) techniques. Data indicates that the dose response for simple-type exchanges is similar for proton and gamma exposure, whereas protons induce higher yields of complex exchanges that are LET dependent. RBE values will be presented for each proton energy, and the effects of shielding and possible cytogenetic signatures of proton exposure will be discussed.

Author

Aberration; Chromosomes; Lymphocytes; Radiation Effects; Relative Biological Effectiveness (RBE); Proton Energy; Blood; Extraterrestrial Radiation

53

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20080009716 NASA Johnson Space Center, Houston, TX, USA

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest

Seaton, Kimberly A.; Bowie, Kendra; Sipes, Walter A.; [2008]; 26 pp.; In English

Contract(s)/Grant(s): NIH M01-RR-0073; Copyright; Avail.: CASI: [A03](#), Hardcopy

Behavioral health services, similar to those offered to the U.S. astronauts who complete six-month missions on board the International Space Station, were provided to 13 long-duration head-down bed rest participants. Issues in psychological screening, selection, and support are discussed as they relate to other isolated and confined environments. Psychological services offered to participants are described, and challenges in subject selection and retention are discussed. Psychological support and training provided to both subjects and study personnel have successfully improved the well-being of study participants. Behavioral health services are indispensable to long-duration head-down tilt bed rest studies.

Author

Astronauts; Mental Health; Psychological Effects; Psychophysiology; Head Down Tilt; Bed Rest; Medical Services

20080010087 Research and Technology Organization, Neuilly-sur-Seine, France

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support

April 2006; In English; RTO Human Factors and Medicine Panel (HFM) Symposium, 24-26 Apr. 2006, Brussels, Belgium; See also 20080010088 - 20080010133

Report No.(s): RTO-MP-HFM-134; AC/323(HFM-134)TP/66; Copyright; Avail.: CASI: [C01](#), CD-ROM

Topics covered include: Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective; Risk, Psychiatry and the Modern Military; The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations; Military Leader's Role in Psychological Support during Deployment; Leader Actions to Enhance Soldier Resiliency in Combat; Enhancing Mental Readiness in Military Personnel; Impact of Combat Duty in Iraq

and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study; Guideline for Early Interventions; The Mental Health Needs Assessment; Commander - Unit Psychologist: A Powerful Tandem; PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale; Morale as a Protection Factor against Mission Related Stress; Military Leader Perspectives of Psychological Fitness; Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005; Global Deployment of Reserve Soldiers: A Leadership Challenge; Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport; The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries; Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad; Stress Training and the New Military Environment; Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not; Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries); Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries; Deployment Support - Strength through Partnership; The Experience of Community in Canadian Military Families: A Female Partners' Perspective; French Army - Family Psychological and Social Support; Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment; Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care; Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces; The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997; The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design; Measuring Morale within the French Army; Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study; Exploratory study on the state of post-traumatic stress in two operational units of the ground army; Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral; Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit; How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future; Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon; The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations; Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks; Family Support in the German Armed Forces; The Navy's Support to Sailors in Operations and their Families in France; Myather is a Soldier - A Children's Book; Battlemind Training: Building Soldier Resiliency; Early Interventions after Critical Incidents - Application; Virtual Reality as a Tool in Early Interventions; and Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy.

Derived from text

Mental Health; Psychiatry; Military Operations; Military Personnel; Morale; Life Support Systems; Leadership; Medical Services

20080010088 Centre de Relations Humaines, Armees, France

Measuring Morale within the French Army

Foret, Jean Michel; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 29-1 - 29-10; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 29; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The evaluation of the operational capability of the Army passes by that of its various components and, particularly, by its human dimension. This element is appreciated, between others, by the morale of personnel and units. Owing to three measuring tools, all modes of consultation are implemented so that the command can gather and exploit a dependable and quality information : the point of view of the leaders, as their function of command, the opinion of the presidents, as representatives of category, but also the opinion of the biggest number by the principle of direct consultation. They then allow the command to take appropriate measures at the earliest to ameliorate collective effectiveness and, as far as possible, the wellbeing of all.

Author

Morale; Armed Forces; Military Personnel; Measuring Instruments

20080010089 Royal Netherlands Military Academy, Breda, Netherlands

Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries)

Moelker, R.; Andres, M.; Poot, G. J. A.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 18-1 - 18-14; In English; See also [20080010087](#)

Report No.(s): Paper 18; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Seeking social support is one of the ways people use to cope with stressful situations. Sometimes people have extensive social networks and do not need support from the organization. Sometimes the organization can stimulate and facilitate informal family support groups. The effectiveness of social support has been much discussed by many scholars (Bell, Segal & Rice, 1995; Cohen & Wills, 1985; Rosen & Moghadam, 1990). Desylva and Gal (1996) already started exploring solutions in order to overcome the conflict between families and the military organization. They focussed mainly on family structures. We hope to bring the discussion a little bit further by focusing on structures of social support networks. From our research concerning social support certain findings were replicated over and over again (Moelker & Clo n, 1997). In the 2001-survey we again found that 64% agreed to the statement the support from family, friends and neighbors is more useful to me than the family support rendered by the army . 39% thinks that family support group meetings are useful, but 63% never visited them. In general family support is very much appreciated, but people tend to think that it is more useful to others than to themselves. These findings raise the question how family support should be organized so that it is as efficient and effective as can be. Exchange theory can provide an answer to this question whilst taking into account that the needs of individuals will differ. What is effective and efficient support to one individual will not be same for someone else. We know much about military families, the way they respond to living in garrison -conditions or to deployment of the soldier in the family. We know much about the stress they experience and their coping behaviour. The psychological theory that concerns the military family (mainly stress theory) is quite well developed. Social psychology makes a contribution with research into the field of social support. In contrast, sociological theory only delivers a very thin description of the phenomenon military family . The best sociological concepts which were applied to the military family stem from the work of Lewis Coser on the greedy institution. It was Segal who first saw the importance of this concept for military families (Coser, 1974; Segal, 1986; Moelker and Clo n, 1996). This work is important, but it is only a beginning. There is a need for, as anthropologists call it, thick sociological description of the military family. Coser and Segal are the giants on whose shoulders we should stand, whose work we have to elaborate empirically and theoretically.

Author

Social Factors; Military Personnel; Support Systems

20080010090 Walter Reed Army Inst. of Research, Silver Spring, MD, USA

The Mental Health Needs Assessment

Cox, Anthony L.; Castro, Carl Andrew; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 7-1 - 7-8; In English; See also [20080010087](#)

Report No.(s): Paper 7; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Throughout the 1990s, allied military medicine and military medical research struggled to determine the nature, causes, and solutions for a series of medically-unexplained symptoms that seemed to plague participants in the 1990-1991 Persian Gulf War. Millions of dollars were spent with mixed results and lingering concerns. A number of researchers and leaders believed (at least at the time) that these phenomena were mostly attributable to psychiatric rather than physical problems. Following the terrorist attacks on September 11, 2001, the USA military again became engaged in major combat operations in the Middle East, prompting concern that another Gulf War Syndrome outbreak could occur. In response to this possibility, the Department of Military Psychiatry at the Walter Reed Army Institute of Research (WRAIR) began the Land Combat Study to measure the prevalence of psychiatric and behavioral problems among Soldiers at various points in the deployment cycle (Hoge, et al., 2004). However, not only did WRAIR survey teams visit units and collect data from Soldiers, they took portable scanners with them into the field and scanned, cleaned, and back-briefed local commanders prior to leaving the area. Commanders and medical personnel assigned to the various units enjoyed the immediate survey feed-back on the prevalence of mental health problems within their units, and the demand from non-surveyed units as well as repeat requests from surveyed units made it necessary to devise a survey tool that units could self-administer. Simultaneously, in 2003, the U.S. Army Medical Department in conjunction with the Coalition Forces Land Component Command (CFLCC) in Kuwait and the Combined Joint Task Force - 7 (CJTF-7) in Iraq sent a team of senior behavioral healthcare (BH) personnel to survey personnel in the Operation Iraqi Freedom (OIF) theater of operations. One finding from that assessment was that prevention

and early intervention services were being offered without any prior assessment of unit or Soldier need, and the team thus made a recommendation that an anonymous, population-based unit needs assessment survey be developed and fielded to organic medical, chaplain, and mental health personnel to correct this deficiency (Operation Iraqi Freedom Mental Health Advisory Team, 2003, 2004).

Derived from text

Military Psychology; Mental Health; Medical Science; Warfare; Military Operations; Medical Personnel; Combat

20080010091 Institute of Aviation Medicine, Fuerstenfeldbruck, Germany

Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon

Willkomm, Bernd; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 36-1 - 36-4; In English; See also [20080010087](#)

Report No.(s): Paper 36; Copyright; Avail.: CASI: [A01](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Because of political restrictions the German Armed Forces had not been involved in NATO - and/or UN - deployments until after the reunification of Germany. After the first experiences with such deployments in the early and mid 90 s it became evident that some kind of psychological support would have to be provided. As a consequence of several dangerous situations and critical incidents the German Armed Forces experienced flying into and in Bosnia the office of the General Surgeon of the German Air Force, which is responsible for all flying personnel of the German Armed Forces, developed a Stress Concept for the Flying Personnel of the German Armed Forces which has been published and established in October 1998. This order describes and regulates the pre- during- and post- deployment training and education as well as the support through early interventions after critical incidents, accidents and fatal enemy or terrorist attacks.

Author

Flying Personnel; Stress (Psychology); Deployment; Education; Armed Forces

20080010092 Army Research Inst. of Environmental Medicine, Natick, MA, USA

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit

Lieberman, Harris R.; Caruso, Christina M.; Niro, Philip J.; Bathalon, Gaston P.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 33-1 - 33-14; In English; See also [20080010087](#)

Report No.(s): Paper 33; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Military training prepares leaders for the stress of combat. However, there have been few studies of the response of well-trained officers to brief, but intense, operational stress. Recently, during a continuous 53- hour military field exercise designed to produce severe stress in participating officers, we examined changes in various behavioral and physiological parameters. Participants were Captains in the U.S. Army Rangers with an average of 9 years of military service. They were exposed to multiple stressors, including minimal preparation time for the exercise, rapid airborne deployment to an unexpected location, high heat and humidity and unanticipated opposing forces (OPFOR) activity. They received minimal rations, were continuously engaged in physical activity and their performance was being evaluated by command authorities. Under these circumstances, their physical status deteriorated, as indicated by a 5% ($p < .001$) weight loss, consisting primarily of water. Their psychological status, assessed with computer-based cognitive tasks, was severely degraded. Vigilance, reaction time, learning, memory and logical reasoning were impaired ($p < .001$). Self-reported mood-states such as, confusion ($p < .001$), fatigue ($p < .001$), and anger ($p = .009$) increased dramatically. The performance decrements observed were greater than those observed in individuals with a blood alcohol level of 0.1 %, legally drunk in many localities, or suffering from clinical hypoglycemia. In spite of such severe physical and cognitive deterioration, cortisol levels of the volunteers indicated they were experiencing minimal stress. The lack of a classic stress response under such severe conditions indicates that extensive prior training, the selection process and perhaps other factors protected these elite officers from the adverse physiological effects of acute stress.

Author

Physiological Effects; Mental Performance; Endocrinology; Combat; Cognition; Hypoglycemia; Physiology

20080010093 Canadian Forces Health Services Group Hqs., Ottawa, Ontario, Canada

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care

Heber, Alexandra; Richardson, Donald; Grenier, Stephane; Darte, Kathy; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 23-1 - 23-14; In English; See also [20080010087](#)

Report No.(s): Paper 23; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Operational Stress Injury (OSI) is the term used in the Canadian military to describe psychological illnesses resulting from traumatic events experienced by soldiers during operational duties. These include post-traumatic stress disorder, depression and substance abuse. The Canadian Forces and Veterans Affairs Canada have established mental health clinics, called Operational Trauma and Stress Support Centres (OTSSC s), and Operational Stress Injury (OSI) Clinics across Canada to facilitate early diagnosis and treatment of members and veterans suffering from OSI s. Yet it often takes years for traumatized soldiers to present for care. There are many reasons for this. Shame, isolation, and institutional stigmatizing of mental illness are compelling counter-forces to the urge to seek help. Recent research has shown that the fear of stigma is one of the principal reasons why soldiers do not seek treatment, even when they recognize that they are suffering from psychological problems. In contrast to this, the literature tells us that early intervention is a critical factor in decreasing the sequelae of PTSD and other mental disorders. In an attempt to address the issue of stigma and other barriers to treatment, the OTSSC developed a partnership with the Operational Stress Injury Social Support (OSISS) program, a peer support program funded by the Canadian Forces and Veterans Affairs Canada. This program uses volunteers and paid employees as peer support workers and co-ordinators, who are either currently-serving military members or veterans who have suffered from deployment-related psychological injuries themselves. The rationale for the OSISS program is based on research showing that social support is an important factor in ameliorating the effects of psychological trauma, and preventing or decreasing the severity of PTSD. Powerful aspects of peer support include the ability to identify with the suffering member, the credibility of the peer in the eyes of the soldier, and the interpersonal acceptance which the peer conveys. This paper outlines how clinicians and peer support coordinators (PSC s) work together to reduce stigma through educational outreach to the troops and the chain of command. It describes how PSC s are often instrumental in getting soldiers into treatment, helping them maintain compliance with treatment, and providing support to military members and their families through difficult emotional times. Case examples will be used to illustrate the effectiveness of this partnership. Challenges to the success of this partnership will be addressed. Issues of maintaining appropriate professional boundaries, and self-care for the peer support worker, will be discussed. Practical guidelines to help military organizations integrate peer support services will be outlined. The relevant literature will be reviewed. This partnership of clinicians with expertise in psychological trauma, and military members and veterans who have coped with PTSD and other psychological problems themselves, is an innovative endeavor supported by the Canadian Forces and Veterans Affairs Canada.

Author

Psychological Factors; Injuries; Mental Health; Medical Services; Clinical Medicine; Diagnosis; Disorders; Emotional Factors

20080010094 Virtual Reality Medical Center, San Diego, CA, USA

Virtual Reality as a Tool in Early Interventions

Widerhold, Brenda K.; Widerhold, Mark D.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 45-1 - 45-8; In English; See also [20080010087](#); Original contains color illustrations

Report No.(s): Paper 45; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Post-traumatic stress disorder (PTSD) is one of the most debilitating psychological disorders affecting USA soldiers and veterans who have been exposed to combat. Treatments for PTSD include psychological debriefing, which has been criticized lately for its questionable efficacy, and imaginal exposure therapy, which is problematic in that some PTSD sufferers are unable to engage well enough to elicit the necessary response. The weaknesses inherent in these treatments have created a pressing need for alternatives. One promising option is to utilize virtual reality graded exposure therapy (VRGET). The Virtual Reality Medical Center (VRMC) is currently conducting research, funded by the Office of Naval Research (ONR) and the Telemedicine and Advanced Technology Research Center (TATRC), studying virtual reality therapy as an early intervention tool for PTSD.

Author

Therapy; Telemedicine; Combat; Virtual Reality; Exposure; Stress Analysis

20080010095 Royal Military Academy, Brussels, Belgium

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations

Manigart, Philippe; Fils, Jean-Francois; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 37-1 - 37-12; In English; See also [20080010087](#)

Contract(s)/Grant(s): ERM-HF-04

Report No.(s): Paper 37; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

With the multiplication of crisis response operations carried out all over the world for more or less extended periods, the need to provide social-psychological support to military personnel in operations and to their families at home has significantly increased and become an important concern for military authorities in most postmodern armed forces. The paper describes the way social-psychological support within the Belgian Defense Department is organized (who are the institutional actors, what is their missions), especially during long-term operations abroad.

Author

Armed Forces; Support Systems; Military Personnel; Deployment; Psychological Factors

20080010096 King's Centre for Military Health Research, London, UK

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment

Greenberg, Neil; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 22-1 - 22-10; In English; See also [20080010087](#)

Report No.(s): Paper 22; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Background: Little is known about what support the UK (UK) armed forces require when they return from operations. Aims: To investigate the perceived psychological support requirements for service personnel on peacekeeping deployments when they return home from operations and examine their views on the requirement for formal psychological debriefings. Methods: A retrospective cohort study examined the perceived psychological needs of 1202 UK peacekeepers on return from deployment. Participants were sent a questionnaire asking about their perceived needs relating to peacekeeping deployments from April 1991 to October 2000. Results: Results indicate that about two-thirds of peacekeepers spoke about their experiences. Most turned to informal networks, such as peers and family members, for support. Those who were highly distressed reported talking to medical and welfare services. Overall, speaking about experiences was associated with less psychological distress. Additionally, two thirds of the sample was in favour of a formalised psychological debriefing on return to the UK. Conclusions: This study suggests that most peacekeepers do not require formalised interventions on homecoming and that more distressed personnel are already accessing formalised support mechanisms. Additionally social support from peers and family appears useful and the UK military should foster all appropriate possibilities for such support.

Author

Support Systems; Medical Services; Psychological Factors; Military Personnel; Armed Forces

20080010097 Defence Scientific Technology Lab., Farnborough, UK

Military Leader Perspectives of Psychological Fitness

Cawkill, Paul; Adler, Amy; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 11A-1 - 11A-8; In English; See also [20080010087](#)

Report No.(s): Paper 11A; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper reports on a sub-section of The Military Leaders Survey: NATO Military Leaders Perspectives on Psychological Support in Operations. It specifically addresses the issue of psychological fitness, which in terms of the survey questionnaire relates to the sections on pre, during, and post-deployment. It was found that in most stages of the deployment cycle education and training to assist in psychological fitness was available to varying degrees for unit members. However, specific support for unit leaders was less prevalent. Assessment of unit readiness was utilised by a number of nations, particularly at the predeployment stage. The Commanding Officer, working in close conjunction with a psychologist, was seen as the key person for assuming responsibility regarding preparing military personnel for operational psychological readiness. Recommendations for further improving mechanisms included the provision of specific, practical, relevant information,

particularly targeted at military leaders, and the need to work more closely with an informed and integrated mental health service.

Author

Mental Health; Military Personnel; Leadership; Psychology; Education; Deployment

20080010098 Swedish Armed Forces, Stockholm, Sweden

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005

Isberg, Jan; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 11B-1 - 11B-8; In English; See also [20080010087](#)

Report No.(s): Paper 11B; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The African war, 1996-2002, formally came to an end when the Peace Agreement was signed in 2002. However, uncontrolled armed groups and local forces, foreign rebel groups and some dissident elements within the Congolese National Army, all mainly located in Eastern Congo, did not accept the Peace Agreement. As a result of their activities, widespread criminality, illegal exploitation of natural resources, ethnic cleansing, weapon smuggling and massacres continued during 2003 and 2004. UN Military Forces, eventually organised into two brigades in the District of Ituri and the Kivu Provinces and, mandated for Chapter 7 operations, became a key asset for the protection of the civilian population, re-establishing security and enforcing the Peace Agreement. Action was taken through a series of military operations, in all 30-40 in number, with the aim of creating a secure environment for the population, disarming militia-men and bridging the conflict within the Congolese National Army. I intend in this short paper to look at three military operations, how they were affected by Psychological Fitness and how in turn Psychological Fitness amongst the ranks of the two brigades also influenced operational effectiveness.

Author

Military Operations; System Effectiveness; Mental Health; Armed Forces; Psychological Factors

20080010099 Canadian Forces Reserves, Kamloops, British Columbia, Canada

Global Deployment of Reserve Soldiers: A Leadership Challenge

McKenzie, Wendy; Hely-Morrow, Isbel; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 13-1 - 13-8; In English; See also [20080010087](#)

Report No.(s): Paper 13; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In both the corporate world and in the armed forces, many theories have been developed to explain the relationship between leadership and team effectiveness. These theories provide the foundation which ensures successful integration of both employees and soldiers into business or military organizational cultures. In both cases, variables such as leadership style, business and mission requirements, coupled with time constraints, are all major factors in operational success. However, what happens when the civilian who becomes a part time soldier is employed in a strictly military environment? Is there an overlap in organizational cultures, or does military leadership need to provide special attention for these unique soldiers? The purpose of this paper is to demonstrate how a deeper understanding of the overlap between civilian and military organizational culture can improve the psychological preparedness of Reserve Force soldiers who are mobilized for full-time military operations.

Author

Armed Forces; Deployment; Leadership; Psychological Factors; Military Operations; Military Personnel

20080010100 Hospital D'Instruction des Armees Du Val-De-Grace, Paris, France

Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army

Vallet, D.; Arvers, P.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 30-1 - 30-8; In English; See also [20080010087](#)

Report No.(s): Paper 30; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Duty in military environment, especially on field, is obviously an exposition risk factor to psychic traumatism. If Post-traumatic stress disorder (PTSD) has a very specific symptomatology, it is not so easy to diagnose this syndrome because people don't talk easily about it for complex reasons. The aim of the study is to evaluate the frequency of PTSD in a military group from two units of the army and evaluate the interest for a brief screening prior medical evaluation. This screening is

discussed with the military general practitioner during the medical evaluation, to reinforce the opportunity to make the diagnosis of PTSD and eventually to deliver care.

Author

Military Personnel; Military Operations; Stress (Psychology); Military Psychology

20080010101 London Univ., UK

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks

Dandeker, Christopher; French, Claire; Birtles, Catherine; Wessely, S.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 38-1 - 38-20; In English; See also [20080010087](#)

Report No.(s): Paper 38; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Introduction and aims: During deployments, Service wives have to adapt to being alone and taking sole responsibility for their families and house-holds whilst dealing with the additional stress about whether their loved ones will return. Stress buffering effects of support networks, whether within or outside the military community, are important factors in the general well being of military wives during deployments. This paper presents results on support networks British Army wives used during the deployment of their spouses to Iraq in 2004/5. Results are also presented (from a parallel study) of the opinion s of the deployed servicemen on the well-being of their wives and families. Methods: A largely qualitative methodology was used based on semi-structured face to face interviews conducted with 50 British Army wives and their spouses. Results: Of the initial 50 wives who were interviewed, 47 of their spouses did deploy. 42 wives were based in Germany and 5 in the UK. 23 of the wives were in paid employment. Post-deployment, the wives response rate adjusted for active refusal (N=4) and ill health (N=1) was 100%. Of the total wives and husbands who were interviewed, 37 matched pairs completed both a pre- and post-deployment interview. Pre-deployment, the majority of wives (65.9%) reported that they did not worry about the additional demands placed on them as a result of their spouse being deployed. Less than one fifth of the wives reported that they had asked for help from the Regiment or other military sources in preparing for their spouse s departure, with the majority seeking their own family (95.7%), and other military wives (85.1%) for informal support. Both during and after the deployment, wives sought and received the most help from other military families and work colleagues. The majority of wives recognised that Regimental Unit Welfare Offices were a potential source of support during the deployment. Support services and charities for military families outside of the regiment were not utilised. The majority of Service husbands (89.2%) felt that home life was more important than their career and 4 (10.8%) stated they felt the deployment had a detrimental effect on their marriage, whereas none of the wives thought the deployment had a detrimental effect and 40.5% thought their husband s career was of equal importance to home life. Approximately half of the wives were not glad that their spouse was in the Armed Forces but a large majority (83%) wanted their husband to stay in the military with financial security being the main reason. Conclusions: In the context of living in an Army garrison town, wives favour informal social networks of support to provide a buffer against the stressors of deployment; and do not expect or choose the military as their first line of support. Army wives are much more tolerant of the pressures that the military place on them than the Soldiers who are less happy with the pressures they think that their career, and especially deployments, puts on their families.

Author

Deployment; Armed Forces; Life Support Systems; Support Systems; Health

20080010102 Defence Research and Development Canada, Toronto, Ontario, Canada

Enhancing Mental Readiness in Military Personnel

Thompson, Megan M.; McCreary, Donald R.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 4-1 - 4-12; In English; See also [20080010087](#)

Report No.(s): Paper 4; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

With psychological injuries accounting for between 10-50% of operational casualties, there is consistent evidence that adequate psychological preparation for deployments is a vital operational requisite. Beyond the psychological costs to soldiers, empirical results also indicate that the stressors found in military contexts can contribute to errors in judgement and performance, reducing operational effectiveness. Thus, the development of training programs that successfully prepares personnel for the psychological rigors of operations, in addition to the physical and technical demand, are important for operational effectiveness and maintaining the well-being of individual military personnel. Although many militaries provide stress management briefings, the ultimate effectiveness of these briefings can be hampered by at least three factors. First, these

presentations are typically a fairly academic discussion of a generic stress model presented in lecture formats that are totally distinct from operational training. This may make the lessons inherent in stress briefings seem unrelated to soldiers experiences. Second, there is virtually no practical training associated with traditional stress management briefings. A final, yet fundamental issue is, of course, the existence of the pervasive stigma associated with mental health issues. All of these factors may contribute to a general resistance toward, and/or denial of, the relevance of this information. Despite these individual and cultural pejoratives that undermine the acceptance of this training, militaries must address the issue of developing psychological resiliency in their personnel. The challenge, then, is to incorporate the important principles of stress management into training in ways that are engaging and relevant to military audiences, and that do not cause psychological reactance due to stigma-related attitudes.

Author

Mental Health; Military Personnel; Education; Stress Analysis; System Effectiveness; Reactance; Deployment

20080010103 Walter Reed Army Inst. of Research, Silver Spring, MD, USA

Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study

Hoge, Charles W.; Castro, Carl A.; Eaton, Karen M.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 5-1 - 5-6; In English; See also [20080010087](#)

Report No.(s): Paper 5; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Previous research has demonstrated a strong link between combat duty and social and family dysfunction. However, most studies of the impact of combat on military families have not been conducted proximal to the time of deployments, and there are many research gaps in understanding the full impact of combat deployment. The current war in Iraq and Afghanistan pose unique stresses on military families. Methods. Over 25,000 surveys have been obtained from U.S. Soldiers and Marines before deployment, during deployment, and up to one year post-deployment. Approximately 40% of these service members are married. In addition, surveys have been collected from military spouses. Outcomes of this analysis included marital satisfaction, divorce, and family violence. Results. Combat duty in Iraq was significantly associated with decreased marital satisfaction, increased intention to divorce, and increased spouse abuse, particularly at the 12-month post-deployment time point. Data from spouse surveys indicated that spouses experience similar rates of depression as Soldiers, but access mental health care at a higher rate. An important finding was that military spouses often rely on primary care for mental health services. Conclusions. Combat duty in Iraq has significant impact on military families. Recommendations for improving services to family members will be presented.

Author

Mental Health; Medical Services; Warfare; Deployment; Combat

20080010104 King's Centre for Military Health Research, London, UK

Risk, Psychiatry and the Modern Military

Wessely, Simon; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. KN2-1 - KN2-16; In English; See also [20080010087](#); Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

We are becoming obsessed with risk. The word itself is increasing in epidemic proportions in everything from the mass media to the medical journals. Reducing risk is increasingly the purpose of public health, and indeed politics. Whenever anything is identified as a 'risk', it is inevitable that this is closely followed by calls to remove it. But there remains one section of society whose raison d'être is to take risks - the Armed Forces. That is the nature of the military contract 1. So when men (and increasingly women) go to war, it remains the case, now and then, that some do not come back, some come back physically injured, and some come back with invisible but often equally damaging injuries, the psychiatric. Just as the notion of a military operation that could ever be free of physical casualties is something devoutly to be wished for, but unlikely to be achieved, so it is with psychiatric casualties as well. War provides an exaggerated, perhaps extreme, version of the entire range of human experiences. It is not just fear, hate and guilt, but also excitement, love, friendship and achievement 2. There is no single 'experience of war', for good or ill. There are some for whom active service remains the best thing that happened to them, and for whom life afterwards became dull and monochromatic. But for many, especially those who are not part of modern, professional, volunteer militaries, war was not the best days of their lives, and when they return appear hail in body, but not in mind. It is these experiences that form the first part of this paper.

Author

Armed Forces; Risk; Psychiatry; Military Operations; Human Beings; Injuries; Public Health

20080010105 King's Centre for Military Health Research, London, UK

How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future

Greenberg, Neil; Langston, Vicky; Scott, Roydon; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 35-1 - 35-6; In English; See also [20080010087](#)
Report No.(s): Paper 35; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Numerous organisations, including the Armed Forces, routinely place their personnel into potentially traumatic environments. It is known that exposure to traumatic events can lead to the development of psychological distress, lowered morale and organizational difficulty. It follows that military personnel are at increased risk of developing trauma related psychological problems and as such it would be useful if a system could be put in place to mitigate such risks. This paper aims to examine the development of Trauma Risk Management or TRiM, a system that was pioneered with the Royal Marines, and to explain the validation study that is now underway to investigate what place, if any, TRiM has in the routine management of traumatic events that effect naval personnel.

Author

Psychological Factors; Military Personnel; Risk; Management Systems; Exposure; Injuries; Morale; Stress (Physiology)

20080010106 Royal Navy, Gosport, UK

Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not

Sharpley, John G.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 17B-1 - 17B-6; In English; See also [20080010087](#)
Report No.(s): Paper 17B; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The literature on effectiveness of stress education is relatively sparse. There is some indication that stress education has some beneficial effect with respect to reducing anxiety and improving coping skills, but so far there is little evidence concerning longer term outcomes. There is no equivalent literature for UK military. Current policy requires all personnel going on operations to have this pre-deployment education, but there is very little evidence to recommend this, other than good face validity. In 2003 approximately 8000 Royal Naval and Royal Marines personnel deployed on Operation TELIC 1. A Mental Health Team (MHT) of four personnel (1 psychiatrist and 3 psychiatric nurses) was deployed with forces afloat. During the transit to the Northern Arabian Gulf, the MHT provided pre-deployment operational stress education to approximately 4000 personnel. Data from the KCMHR study into the health and wellbeing of UK Armed Forces personnel who deployed on Operation TELIC 1 has allowed a linkage study to look at the effect of a pre-operational stress brief. RESULT: [Data yet to be analysed] CONCLUSIONS [To be confirmed]

Author

Stress Analysis; Mental Health; Military Personnel; Anxiety; Health

20080010107 Royal Danish Defence Coll., Copenhagen, Denmark

My Father is a Soldier - A Children's Book

Hommelgaard, Birgitte; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 41-1 - 41-4; In English; See also [20080010087](#)
Report No.(s): Paper 41; Copyright; Avail.: CASI: [A01](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The wellbeing of the family is an important prerequisite for the soldiers ability to do his/her job in international missions. Through many years social workers and psychologists in the Danish Armed Forces have given lectures and information to relatives before, during and after deployment. The relatives receiving this offer are in this connection limited to partners and girl/boyfriends. But also the children are occupied with questions and considerations about a parent s deployment for a longer period. Children need to know what is going to happen and they need to know that it is OK to be angry, selfish, to forget the deployed parent, etc. In order to help the children The Royal Danish Defence College has made a children s book that describes the normal reactions among children being separated from one of their parents. The book is written on basis of research among parents and specialists and describes subjects as anger, communication, worries, disappointments, etc. The text and the drawings inspire to talks between parents and their children between 4 and 7. The book is distributed to all personnel with children in the age group before deployment.

Author

Armed Forces; Children; Texts; Military Personnel; Deployment

20080010108 Centre de Recherches du Service de Sante des Armees, La Tronche, France
The Navy's Support to Sailors in Operations and their Families in France

Arvers, P.; Degrange, X.; Lajous, O.; C;ervpu. ; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 40-1 - 40-6; In English; See also [20080010087](#); Original contains color illustrations

Report No.(s): Paper 40; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In the French Navy, military psychologists and psychiatrists often organize support groups or other therapeutic interventions in times of crisis or severe stress[1,2]. Mental health care professionals (child psychologists) often aid in the explanation of the effects prolonged absences of a family member on the family (marital and parental relations) before and during deployment. For a few years, the French Navy has taken into account social support to sailors and their families during deployments. The description of this support in the Navy is illustrated by a survey conducted among 270 families during Heracles mission, in 2002.

Author

Navy; Support Systems; Surveys; Therapy; Mental Health

20080010109 Marine Corps for Manpower and Reserve Affairs Headquarters, Quantico, VA, USA
Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces

Nash, William P.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 25-1 - 25-10; In English; See also [20080010087](#); Original contains color illustrations
Report No.(s): Paper 25; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Combat/operational stress control, defined as programs and policies to prevent, identify, and manage adverse combat/operational stress reactions, is the primary responsibility of military commanders. The role of military mental health professionals in combat/operational stress control is to adapt scientific tools for prevention, identification, and treatment for use by military leaders at all levels. The historical gap between military cultures and those of mental health professions has been an obstacle to the full partnership of psychiatry and the military. Differences in how stress is perceived, and problems with the conceptualization of adverse stress reactions have contributed to the marginalization of military psychiatry in theatre, and a widening gap between stress problems identified in theatre and those surfacing after deployment. The U.S. Marine Corps Operational Stress Control and Readiness (OSCAR) program is an innovation that attempts to bridge the gap between mental health science and the art and science of military operations by embedding mental health professionals at the level of infantry regiments, air wings, and logistics groups. OSCAR mental health professionals are not primarily clinical health care providers, but rather combat/operational stress control specialists who educate and are educated by their Marines through repeated contact in the field and the sharing of adversity, before deployment, during deployment, and after deployment. The OSCAR program shows promise as a line military tool to reduce stigma, increase awareness among warfighters of combat/operational stress control principles, provide effective care within the small unit, increase access to care, and reduce long-term deployment-related stress problems.

Author

Military Psychology; Mental Health; Medical Services; Deployment; Stress Analysis; Psychiatry; Military Operations

20080010110 Canadian Forces Health Services Group Hqs., Ottawa, Ontario, Canada
Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries
Guest, Kimberly; Prefontaine, Anne; Grenier, Stephane; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 19-1 - 19-22; In English; See also [20080010087](#)
Report No.(s): Paper 19; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Over the last two decades, Canadian military members have experienced a significant increase in their participation in military operations, both abroad and at home, escalating the number of soldiers¹ dealing with psychological injuries. Those returning home from deployment with symptoms of psychological distress and reduced functioning have a profound impact on their family system. Families, specifically spouses, are often the sole source of support for the injured persons. Their long-term efforts to empathize for their partners and cope with the effects of caring for them, directly impacts their health and social functioning. Thus, assisting the supporting spouses to repair any damage done to the system itself is crucial to prevent

burn out, but also to ensure the successful treatment of these military members. To do so the Canadian Forces has established two programs dedicated to assisting military members and their families dealing with psychological injuries resulting from military operations. These programs work in collaboration to offer different services that compliment each other and provide a holistic approach to prevention, education and treatment. The first program provides clinical expertise in treating these families; while the second, offers a new approach to providing social support services, through the utilization of a network of peers, who have also experienced the stress of caring for psychologically injured members. Even with this cohesive service system, there are still barriers and challenges to providing care to this population, and future enhancements to this system are required in order to fully meet their needs.

Author

Health; Injuries; Military Operations; Support Systems; Deployment; Prevention

20080010111 Defense Advanced Research Inst., Sofia , Bulgaria

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad

Yanakiev, Yantsislav; Nikolova, Krasimira; Marinov, Iliya; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 16-1 - 16-18; In English; See also [20080010087](#) Report No.(s): Paper 16; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The aims of the report are to assess the social psychological factors, influencing the stress level and the quality of duty performance before, during and after deployment. In addition, it aims at assessing existing problems in selection, education and training of military personnel working in multinational environment during modern military operations. Furthermore, the paper summarizes the commanders assessment of the psychological support effectiveness and efficiency. Finally, measures for improving the system for psychological preparation and participation of the Bulgarian military in international operations are suggested. The presented empirical data is obtained through recent surveys carried out in cooperation between Defense Advanced Research Institute at Rakovski Defense and Staff College and the Center for Military Psychology and Prevention. The data analysis aim at assisting the optimal decision making of the commanders in improving the psychological support system as well as the overall activities associated with the Bulgarian contingents deployment in missions abroad. Based on the analyses the researchers team stands for the opinion that the training aimed at building skills for stress prevention and control in its biggest part happens during the overall units predeployment training and leaders training for mission deployment. In this respect, the paper contains a broader circle of recommendations, going outside the frame of the narrow psychological training. In our opinion, the stress prevention and control training should be incorporated as an implicit part in the everyday training and education of the Peace Support Operations participants.

Author

Deployment; Military Personnel; Military Psychology; Psychological Factors; Social Factors; Support Systems; Leadership

20080010112 Research and Technology Organization, Neuilly-sur-Seine, France

Morale as a Protection Factor against Mission Related Stress

Garrido, M. J.; Munoz, M. J.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 10-1 - 10-20; In English; See also [20080010087](#) Report No.(s): Paper 10; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Considering the importance that stress has in the armed forces, it is necessary to study those factors that reduce the probability of apparition of it. From the prevention point of view, the studies show different factors that can reduce the negative impact of this phenomenon (Distress). Among these factors, morale plays a fundamental role. Since Spain began in 1988 its participation in operations of peace and human aid, by mandate of the UN, to our days, we can verify the increase of the same and the importance that in them has the role of the psychologist reflected in the memories of the units of psychology unfolded in the operation zones. Given the extensive investigation of this phenomenon in the sanitary and educational environments, we intend, through a retrospective study, to determine as morale is constituted like a protection factor that could come to reduce the first symptoms of the labor stress in military units. We propose a new model based on the positive psychology principles, to be developed during the peacekeeping operations.

Author

Stress (Psychology); Morale; Psychology; Signs and Symptoms; Armed Forces; Education; Prevention

20080010113 NATO Research and Technology Organization, Paris, France

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy

Meijer, Marten; deVries, Rodney; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 46-1 - 46-6; In English; See also [20080010087](#); Original contains color illustrations

Report No.(s): Paper 46; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Practices in early psychological interventions after critical incidents have been the focus of research for several years now. In an article in *The Lancet* in 2002, it was concluded on the basis of seven international studies that individual single session debriefing does not lead to a decline in the incidence of Post Traumatic Stress Disorders (PTSD) among the victims of accidents or traumatic events. At the international level, it was recommended that the term debriefing should be replaced by the term early intervention, and that a stop should be put to the debriefing of victims of shocking events. The debate about early interventions in the Netherlands Armed Forces continued in 2004 in the memorandum to the State Secretary for Defense from the former Inspector-General of the Armed Forces. The Ombudsman of the Canadian Armed Forces suggested in 2004 a policy on End of Deployment Debriefings in his memorandum on Third Location Decompression, in which redeploying troops stay together on the transit home in a safe place to share experiences and expectations. In 2004 the Royal Navy rolled out their Risk Management approach in operational units of the Royal Marines, in which they assess the risk for the development of adaptation problems after redeployments. It appeared that more than 90 percent of the American soldiers, who were wounded in Iraq and were recovering in the American Fleet Hospital Eight in Spain, rated their debriefing in this hospital helpful or very helpful. In this paper we present the data of research of satisfaction of military personnel with recent group wise End of Deployment Debriefing in the Royal Netherlands Navy and the Royal Netherlands Marine Corps. The central question of this research is: how is a group wise debriefing evaluated by the military personnel of the Royal Netherlands Navy, in a sea-going unit and in a marine corps unit? We used questionnaires, which have been filled out by 378 military personnel, immediately after their deployment. Results show that a vast majority of these personnel is satisfied with this type of End of Deployment Debriefing. It is recommended to improve the effects of the debriefing for homecoming, especially by focusing on realistic expectations of the homecoming.

Author

Military Personnel; Deployment; Psychological Factors; Armed Forces; Mental Health

20080010114 Defence Scientific Technology Lab., Farnborough, UK

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations

Cawkill, Paul; Adler, Amy; vandenBerg, Coen; Arvrs, Philippe; Puente, Jose; Cuvelier, Yves; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 1-1 - 1-22; In English; See also [20080010087](#)

Report No.(s): Paper 1; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper reports on a military leaders survey conducted by members of the NATO HFM RTO Task Group on Stress and Psychological Support in Modern Military Operations (HFM-081/RTG). The goal of the survey was to assess military leaders attitudes on the psychological support to unit personnel provided on operations. Sixteen NATO nations participated in the project between June 2005 and January 2006, which included either a face-to-face interview or a postal questionnaire approach. There were 172 responses, or about 10 surveys per nation. Findings emphasized the importance military leaders across nations placed on psychological support on operations, and the need for integrated mental health support at pre-deployment, during deployment, and at post-deployment. In general, the participating military leaders reported perceiving little stigma associated with stress-related responses and help-seeking behaviour. Respondents also stated their preferences for concrete and specific information related to recognizing and managing psychological stress reactions on deployment. The information obtained here will be used to guide the development of a HFM-081/RTG booklet containing information and practical guidelines for military leaders on managing operational stress.

Author

Leadership; Military Operations; Psychological Factors; Support Systems; Deployment; Stress (Psychology)

20080010115 Slovak Armed Forces, Bratislava, Slovak Republic

Military Leader's Role in Psychological Support during Deployment

Novosad, Ondrej; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 2-1 - 2-6; In English; See also [20080010087](#); Original contains color illustrations
Report No.(s): Paper 2; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Slovak armed forces (SAF) have taken taking part in Modern Military operations (NATO / UN peace keeping mission) since 1993. However SAF newer participated in so extremely dangerous and life threatening military operation, Slovak soldiers continuously fulfilling their tasks in central Iraq longer than two years. That information comprises factually experiences from Commanders of the 1st Slovak engineer contingent in Iraq -- Col. NOVOSAD. All of his pieces of knowledge are presented from realistic points of view, without any distortion. In second part, there is included an explanation of various differences between deployed soldiers expectation and the reality in Area of Operation (its position, tasks, limitations) and possible consequences during deployment to Iraq. It is intended to let an experience (lessons learned) from Operation Iraqi freedom, to show any possible influence of adverse factors (life threatening, lack of needs, or extreme climate condition) to serving soldiers, and finally how to keep psychological readiness and how to develop positive moral within unit member during the operational deployment.

Author

Leadership; Deployment; Support Systems; Psychological Factors; Military Operations; Armed Forces

20080010116 Centre for Psychological and Sociological Activities, Bratislava, Slovak Republic

Commander - Unit Psychologist: A Powerful Tandem

Stepo, Pavol; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 8-1 - 8-4; In English; See also [20080010087](#)
Report No.(s): Paper 8; Copyright; Avail.: CASI: [A01](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Commander stands for the virtues of wisdom, sincerely, benevolence, courage and strictness. There is no commander, who can be successful without those five qualities. But only one can win, who understands. (Sun-Tzu). These words of the important and clever person adequately uncover background of the possible relations and interactions between commander and psychologist.. Only few of soldier - specialists (psychologist, mental health professional or chaplain...) realized the origin of fragile relations, even in tense situations during NATO operational deployment. Those relations are based on mutual supporting, understanding and respecting of functional peculiarities of their tasks. They should be synergic oriented for fulfilling one and only goal. 'Accomplish their tasks with success and back home without injury'. For commander that could means 'Without physical injury', for psychologist on the other side 'Without psychical trauma'. Methods and tools which are using by them are different from people to people. Finally it really does not depend on their position in unit but ... The good fighters of old first put themselves beyond the possibility of defeat, and then waited for an opportunity of defeating the enemy.

Author

Mental Health; Deployment; Words (Language)

20080010117 Department of National Defence, Ottawa, Ontario, Canada

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale

Sudom, Kerry; Dursun, Sanela; Flemming, Steve; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 9-1 - 9-22; In English; See also [20080010087](#)
Report No.(s): Paper 9; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Following a decade of increased frequency and intensity of international and domestic operational deployments by the Canadian Forces (CF), a range of anecdotal data gathered in 2000 suggested that significant personal difficulties were being experienced by military members. The PERSTEMPO (Personnel Tempo) and Human Dimensions of Deployments Study (HDDS) was established in order to meet the growing awareness of the need to assess the human dimensions of performance among military personnel. In addition to deployments, day-to-day aspects of job functioning may have a significant effect on the morale of military members. It is important to recognize the factors that may influence the relationship between job-related stress and morale, so that efforts and resources to increase the operational effectiveness of the CF can be directed appropriately. To this end, the present paper explored the buffering effects of horizontal cohesion, vertical cohesion, and coping on the relation between job-related stressors and morale in the CF. It was found that vertical and horizontal cohesion moderated the

effects of job stressors on unit morale, such that the negative effect of job-related stressors on morale in units was attenuated if members experienced high levels of cohesion in their unit and cohesion with their superiors. Moreover, job stressors and cohesion had direct effects on personal morale. Coping strategies did not act as moderators, but instead had strong additive effects on morale, such that high levels of active coping, and low levels of passive coping, predicted higher morale. The findings are discussed in terms of the implications for programs and resources aimed at increasing morale among military members and units.

Author

Human Performance; Morale; System Effectiveness; Deployment; Military Personnel; Cohesion

20080010118 Halifax Military Family Resource Centre, Halifax, Nova Scotia, Canada

Deployment Support - Strength through Partnership

Calvert, Cllleen; Switzer, G.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 20A-1 - 20A-10; In English; See also [20080010087](#); Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Halifax Military Family Resource Centre (MFRC) in conjunction with the Department of Military Family Services (DMFS) presentation is an overview of the Family Separation and Reunion Program, including how this program is implemented to meet the needs of the Canadian Forces community. The Family Separation and Reunion Program is provided to family and military members when Canadian Forces members deploy for 30 days or more on exercise, or on operations such as NATO s Standing Naval Forces Atlantic. Using the recent deployment of Her Majesty s Canadian Ship MONTREAL, as a working example, this presentation highlights the exceptional relationships, the process and the benefits to these relationships between the Canadian Forces, family, Military Family Resource Centres and the Department of Military Family Services and outlines how these programs and services were developed to support the members and families of the Canadian Forces.

Author

Deployment; Support Systems; Physical Exercise; Medical Services

20080010119 Walter Reed Army Inst. of Research, Silver Spring, MD, USA

Battlemind Training: Building Soldier Resiliency

Castro, Carl Andrew; Hoge, Charles W.; Cox, Anthony L.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 42-1 - 42-6; In English; See also [20080010087](#) Report No.(s): Paper 42; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Battlemind is a Soldier s inner strength to face fear and adversity in combat in with courage. The predeployment Battlemind training program is designed to build Soldier resiliency by developing his/her self-confidence and mental toughness. The training focuses on Soldier strengths, identifying specific actions that Soldiers and leaders can engage in to meet the challenges of combat. The pre-deployment training consists of unique modules for Soldiers, leaders, reservists, and families. The post-deployment Battlemind training focuses on transitioning from combat to home. The acronym 'BATTLEMIND' identifies ten combat skills that if adapted will facilitate the transition home. The post-deployment Battlemind training consists of two training modules to be conducted at different times post-deployment. The first training module is intended to be given within the first two weeks of returning home. The focus of this initial transition training is on safety, relationships, as well as normalizing to common reactions and symptoms resulting from combat. The second training module is designed to be given at 3-6 months post-deployment. This follow-up post-deployment training is designed so that Soldiers can conduct their own 'Battlemind Check' of themselves as well as that of their buddies, allowing them to know when to seek help. The training ends by addressing those barriers which prevent Soldiers from seeking help. The Battlemind training is designed to be given in small groups to encourage interaction and discussion, requiring approximately 35-40 min to complete.

Author

Combat; Deployment; Military Personnel; Signs and Symptoms; Fear; Education

20080010120 Institute of Aviation Medicine, Fuerstenfeldbruck, Germany

Early Interventions after Critical Incidents - Application

Petrie, Stefanie; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 43-1 - 43-8; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 43; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The application of early interventions after Critical Incidents varies depending on the location, the situation and the people

involved. In this presentation the application of early interventions after three different Critical Incidents is illustrated. April 2004: Two Tornado PA 200 fighter jets collided in midair during a basic fighter maneuver. Both crewmembers of one aircraft died and the two crewmembers of the second aircraft got severely injured. December 2004: A Tornado PA 200 flew into the ground after a two ship formation take off. Both crewmembers died. January 2005: After the 'Tsunami' flood catastrophe in Southeast Asia the German Armed Forces sent medical and flying personnel of the Strategic Air Medical Evacuation Command to Phuket and Bangkok to evacuate injured and non-injured victims in specially equipped aircraft (Airbus A310). After all these Critical Incidents early interventions according to the Critical Incident Stress Management (CISM) was provided by the Division of Aviation Psychology. Experiences in carrying out various approaches and methods of CISM are portrayed.

Author

Medical Personnel; Medical Services; Evacuating (Transportation); Critical Loading; Armed Forces; Aviation Psychology

20080010121 Ministry of Defence, Hague, Netherlands

The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997

Eimers-van Nes, Rejanne; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 27-1 - 27-10; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 27; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Every commander tries to accomplish his/her mission by applying a contribution to a military product, called military capacity or fighting power. This military product contains 3 components. These are the conceptual component, the physical component and the mental component. The mental component can be described, as the will to fight and contains three major aspects: leadership, motivation and military conduct. Military literature and my own experience shows that it is more difficult to assess the quality of leadership, cohesion, hardiness etc within a unit, in contrast to the conceptual and the physical component. In 1997 the BSSC (Behavioural Sciences Services Centre) developed a morale questionnaire to support commanders to measure mental elements and to give them advice to improve. This morale research has been developed and improved, resulting in the product the BSSC now works with. The Dutch definition of morale is; the mental state of the individual soldier, in a task oriented group, in relation to maintaining the assignment and the operational tasks his group stands for. In 2001 the questionnaire has been evaluated and validated. In 2005 the BSSC conducted a second evaluation using interviews with several commanders who have been served in Iraq, Bosnia and Afghanistan between 2003 and spring 2005. The goal of this evaluation was to check the quality of the Dutch morale research and the process. It also gave the possibility to collect opinions of commanders and to find out if the product still covers the needs of the commanders concerning this subject. The third goal was to do an inventory which other needs there are among the commanders concerning research of the mental component in general. The aim of this article is to inform about the meaning commanders have concerning morale and the process used by the BSSC.

Author

Military Personnel; Military Operations; Military Psychology; Morale

20080010122 Bundesministerium der Verteidigung, Bonn, Germany

Family Support in the German Armed Forces

Kreim, Guenter; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 39-1 - 39-6; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 39; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In recent history, German armed forces have been transformed into a modern, internationally recognized force. Readiness suddenly was a major issue and personal disposition was a core value of a soldier's profession. Soldiers suddenly had to be prepared for a broad variety of international missions. The most crucial link to this new military environment is the link to the home front. A soldier's individual social network including spouse, children, partner, parents, relatives and friends as well as comrades in arms, is essential for his or her well being. To support this network as effectively as possible is a major challenge and key responsibility for military leaders. In this article the family support organization of the Bundeswehr will be described, especially its network structure, the contribution of different faculties, volunteers and NGOs to the system. Quality management is also an essential issue of the support program. Some statistical data and conclusions of a field research study will be presented and discussed.

Author

Armed Forces; Support Systems; Military Personnel; Germany; Motivation; Military Operations

20080010123 Walter Reed Army Inst. of Research, Silver Spring, MD, USA

Leader Actions to Enhance Soldier Resiliency in Combat

Castro, Carl Andrew; Adler, Amy B.; McGurk, Dennis; Thomas, Jeffrey L.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 3-1 - 3-14; In English; See also [20080010087](#)

Report No.(s): Paper 3; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Combat places extraordinary demands on every individual, particularly the junior leader. The cumulative demands of combat may affect the leader's ability to lead his or her unit, resulting in members of their unit being tempted to quit. However, there are actions that leaders can take to build resiliency in their Soldiers, enabling them to lead their subordinates through the stressors of combat. Within the framework of social psychological contract theory, we outline two general approaches to leadership, the rigid institutional approach and the flexible pragmatic approach. The rigid institutional leader is characterized by (a) performing only those leader actions mandated by directives (such as policies and regulations), (b) demanding that subordinates show them respect based on their position within the organization and (c) forbidding any form of criticism from their subordinates. In contrast, the flexible pragmatic leader is characterized by (a) engaging in actions that are not mandated by policies or directives, such as giving Soldiers time off following high periods of workload, (b) expecting respect shown to them by their subordinates to be based on both their position within the organization and the soundness of their decisions, and (c) encouraging their subordinates to criticize their policies and decisions with the aim to improve unit functioning. Next, based on surveys and focus groups with Soldiers in a combat environment or with Soldiers recently returned from combat, we identify those leader actions that serve to build Soldier resiliency, focusing on both behaviors that leaders should and should not engage in.

Author

Leadership; Combat; Military Personnel; Workloads (Psychophysiology)

20080010124 Canadian Forces Health Services Group Hqs., Ottawa, Ontario, Canada

Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral

Zamorski, Mark A.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 32-1 - 32-22; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 32; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Objective: This study explores the associations among the timing of post-deployment screening, the apparent prevalence of health problems, and the likelihood of referral for further care. In addition, it explores participant preferences for the timing of enhanced post-deployment screening. Background: Better post-deployment screening has been proposed as an important strategy to decrease the burden of deployment-related health problems. The optimal timing of such screening is uncertain: If done immediately upon return, few members endorse health concerns, perhaps because of a honeymoon effect in which homecoming is seen as the solution to any and all problems. Once the honeymoon period is over, screening too soon risks over-identification and labelling of those with self-limited problems, while screening too late risks missing an opportunity to intervene early and prevent complications. Using data collected during the evaluation of a new, enhanced post-deployment screening process, this study explores the optimal timing in two ways: First, it explores, in a naturalistic fashion, the association of different timings with the apparent prevalence of health problems and with the likelihood of referral for further care. Second, it explores participant preferences with respect to timing, as expressed on an anonymous evaluation form. Methods: Approximately four to six months after return from Afghanistan in 2001 - 2002, Canadian Forces (CF) members from all three branches (Land, Sea, and Air) were required to complete the SF-36 Health Survey, most of the PRIMEMD Patient Health Questionnaire (PHQ), and a shortened version of the Mississippi Scale for Combat-related PTSD. The survey results were entered into a Microsoft Excel spreadsheet that generated a customized report with an interpretation of the instruments. This report was reviewed by a mental health professional, who then administered a 40-minute semi-structured interview covering a broad range of areas of biopsychosocial well-being. The interviewer recorded his or her potential concerns about a variety of physical, mental, and social health issues and made recommendations for further evaluation or care, if indicated. Those interviewed were offered the opportunity to complete an anonymous evaluation form and to consent to the anonymous use of their data for research purposes. Results: 2,528 out of 4,140 eligible members (61%) consented to research use of their survey and interview data; of these, 2,053 (81%) had usable information on the timing of the screening relative to return from deployment. This sample was 92% male with an average age of 35 years and an average number of previous deployments of 3.3. For logistical reasons, the lag time from return from deployment to screening varied, taking place

prior to 120 days of return in 488 (23.8%) participants, between 120 and 180 days after return in 344 (16.8%), and more than 180 days after return in the remaining 1221 (59.5%). One or more mental or physical health problems were identified on the PHQ or Mississippi Scale in 1011 participants (53.9%), and some sort of follow-up was recommended in 384 (18.7%).

Author

Deployment; Mental Health; Risk; Health; Males

20080010125 Royal Netherlands Marine Corps., Utrecht, Netherlands

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective

Cammaert, P. C.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. KN1-1 - KN1-8; In English; See also [20080010087](#); Copyright; Avail.: CASI:

[A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

From the experiences as a commander taking part in 6 peace support operations in Hong Kong, Cambodia, Bosnia and Africa the principles of Leadership and Stress Management appeared to be useful to provide psychological support to deployed troops. Key factors in Stress Management are realistic training, fostering unit cohesion in arduous environments, communicating and providing time outs. Systematic evaluations of post deployment care show that third location decompressions allow deployed personnel to share their experiences immediately after a deployment and help to reach mental health care professionals if necessary. Evaluations of mental health care and reunions, which are organized five years after a deployment, show that the deployed personnel highly appreciates this type of care and the possibility to share the memories of those days. Commanders need the support of military mental health professionals in caring for those deployed personnel who cannot cope with their deployment experiences.

Author

Stress Analysis; Psychological Factors; Mental Health; Communicating; Military Operations; Leadership; Deployment; Military Personnel

20080010126 Portugese Air Force Centre, Lisbon, Portugal

Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport

Surrador, Antonio Alberto; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 14-1 - 14-14; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 14; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Portuguese Armed Forces have sent 37 military personnel to Afghanistan whose main objective was to take on the command of Kabul International Airport (KAIA) for circa 4 months (from August to December 2005). During the preparation for this peace support operation, the commander of the task force, asked the Air Force Psychology Centre for cooperation, which was further designated 'the support of Psychology to KAIA Command'. An intervention programme was elaborated so as to be implemented in the different mission phases. The present paper describes and analyzes the experiment of psychological evaluation and intervention in the support to the present ISAF mission.

Author

Military Personnel; Psychology; Security; Armed Forces

20080010127 Impact Foundation, Amsterdam, Netherlands

Guideline for Early Interventions

deVries, Maaïke; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 6-1 - 6-8; In English; See also [20080010087](#); Original contains color illustrations Report No.(s): Paper 6; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In the Netherlands, acute psychological assistance, also referred to as early interventions or debriefing, is offered following shocking events. These may be large scale disasters or calamities, but also military deployment and individual incidents. During the last years, the demand for early interventions has been increasing. International literature has shown that the psychosocial effects of disaster and military deployment may last for years. Therefore psychosocial care is essential, but it may be questioned if those affected benefit from early interventions that are offered nowadays. In scientific literature there is growing consensus that single session debriefing is not effective and even may do harm. Despite this unequivocal conclusion, single session debriefing is still practised. Furthermore, experts do not agree on the appropriate moment when

early interventions should take place, what disciplines are best equipped to do the job and what methodology should be followed. Until now, interpretation, practice and possibly the follow-up of early interventions depend on the view of organisations, individual care-providers and various interests. As a result of this, early interventions are offered in many ways, and those affected are not always treated in accordance with best-practices. In short, on the shop-floor and in the theatre, careproviders have doubts on early interventions. Therefore, it is crucial to make evidence based recommendations. The Impact Foundation develops, in collaboration with the Trimbos institute for mental health and subsidised by the Dutch Ministry of Health, Welfare and Sports, an evidence based guideline for early interventions following disaster, terrorism and other shocking events. Based on the latest insights from literature and daily practice, this guideline addresses what works, what doesn't work and what the gaps are in our knowledge.

Author

Mental Health; Therapy; Procedures; Disasters

20080010128 Naval Medical Research Unit No. 3, Cairo, Egypt

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study

Riddle, Mark S.; Sanders, John W.; Jones, James J.; Webb, Schuyler C.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 31-1 - 31-8; In English; See also [20080010087](#); Original contains color illustrations

Report No.(s): Paper 31; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Evident mental health needs among combat veterans following their return from operations in Iraq and Afghanistan have been described. To our knowledge, no data are available describing the mental health status of military personnel during these deployments. We report data collected from personnel systematically selected from current combat regions participating in a rest & recuperation (R&R) program in Doha, Qatar. During R&R in-briefs, mandatory completion of a clinic screening survey designed to identify individuals who may need medical treatment was conducted. Incidence of combat stress indicators are described and evaluated for relative differences by, country, rank and calendar time. Overall, 40,620 troops completed a clinic screening form between October 2003 and January 2005. Of these, active duty military personnel from Iraq accounted for 60.1% (n=24,428) of the population, and 13.7% were from Afghanistan (n=5,569). The remainder of troops which reported their unit of assignment were from Uzbekistan (n=337) or other various countries in the region (n=138). Rates of self-reported depression among those in Afghanistan were lower than those of troops from Iraq (32.3 vs. 69.7 per 10,000, $p < 0.0001$). Feelings of depression and self-harm were inversely correlated with rank (4-level ordinal grouping) (Beta(sub Coef)= -0.21, $p = 0.0006$, Beta(sub Coef)= -0.49, $p < 0.00001$, respectively). Preference for seeing a chaplain trended towards a positive correlation with rank (Beta(sub Coef)=1.24, $p = 0.13$). There were distinct temporal trends found in reported combat stress rates over time which appeared to match the rate or number of deaths reported in the country during the same period. For self-reported depression in Iraq, the rate during May 2004 was higher than other months and was preceded by a month ('Bloody April') where troops experienced high fatality rates. Similarly, for Afghanistan while more variable, there appears to be a positive association between rates of self-reported depression and numbers of reported fatalities during that month. These data support previous reports of higher mental health problems among troops in Iraq compared to Afghanistan and lower healthcare seeking behavior overall. Greater risk among lower ranks and during months following heavy combat are evident. In an effort to remove recognized barriers to care and minimize combat stress effects, we believe it is critical to recognize mental health needs and initiate services during combat deployments.

Author

Epidemiology; Combat; Stress Analysis; Mental Health; Military Personnel; Sensory Feedback; Deployment; Medical Services

20080010129 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Soesterberg, Netherlands

Stress Training and the New Military Environment

Delahaij, R; Gaillard, A. W. K.; Soeters, J. M. L. M.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 17A-1 - 17A-10; In English; See also [20080010087](#)

Report No.(s): Paper 17A; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The new environment in which current military operations take place is often characterized by unpredictable and ambiguous situations. This places new demands on military personnel. In combination with high levels of violence and threat, these situations will elicit acute stress reactions, which can impair performance and the ability to operate effectively. It may be questioned whether the current practices to train military personnel to cope with stress are still appropriate. The topic of

this study is to examine whether the current training practices are appropriate to prepare military personnel for the new demands of these challenging situations. To answer this question a research program was set up. This program focuses on the current stress training practices and their effectiveness in acute stress situations in the military environment. The study consists of a review and analysis of literature on current military stress training practices and research. Also, interviews were held with military personnel to get a deeper understanding of the demands that acute, unpredictable and ambiguous threatening situations place on military personnel. Interviews with instructors of the Dutch army in the field of stress training were conducted to help assess the successful factors and constraints of the current training methods. Supported by knowledge about acute stress reactions, this will provide criteria for structural factors that have to be present in the stress training. The results of the review and interviews will be presented and discussed.

Author

Stress Analysis; Education; Military Personnel; Military Operations

20080010130 Royal Military Academy, Brussels, Belgium

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design

Fils, Jean-Francois; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 28-1 - 28-8; In English; See also [20080010087](#); Original contains color illustrations
Contract(s)/Grant(s): ERM HF-04

Report No.(s): Paper 28; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Soldiers morale has been for a long time ago of interest among military leaders (Manning, 1991). In this respect, it is extremely important for military commanders to investigate, and eventually be able to take corrective action during Crisis Response Operations. However, although this concept is important for military leaders, there is little agreement about its definition (Gal, 1986; Gal & Manning, 1987; Motowildo & Borman, 1977, 1978). Nevertheless, three elements seem to play an important role in it: soldiers motivation, satisfaction and group cohesiveness (Motowildo & Borman, 1978). The goal of this paper is to report results from periodic surveys of Belgian military personnel carried out for the Mental Readiness Advisor of the Defence Staff by the Department of Behavioral Sciences of the Royal Military Academy. These periodic surveys serve to evaluate indicators of well-being during Crisis Response Operations. Before 2005, data collection methods were not standardized (the survey instrument differed from mission to mission) and there was no central database, making it impossible to analyze trends and compare units and missions. So, to remedy this situation, the Belgian Defence Staff decided, in 2005, that the existing questionnaires used to investigate well-being before, during and after Crisis Response Operations should be standardized. On the basis of the previous ones, a new standardized sociological survey instrument was constructed. Contrary to psychologists who make extensive use of psychological scales to approach latent constructs, most sociologists tend to use single items to evaluate constructs. The main advantage of single items questions is that more questions, and therefore areas of interests, may be investigated; the disadvantage, however, is the relative lack of reliability, of range of the latent concept they explore in comparison with scales. The questionnaire developed for the Belgian Defence Staff is oriented towards the collection of practical information and is therefore not designed to meet psychometric criteria like validity or reliability. Nevertheless, we found in this survey items related to morale defined as a tripartite model including soldiers satisfaction, motivation and group cohesiveness. The aim of this paper is to show how, a priori, we can derive information related to morale in order to inform commanders from a questionnaire not constructed specifically to measure this concept.

Author

Military Personnel; Psychometrics; Morale; Motivation; Deployment; Cohesion

20080010131 National Defence Headquarters, Ottawa, Ontario, Canada

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries

Garbutt, Philip F. C.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 15-1 - 15-46; In English; See also [20080010087](#); Original contains color illustrations
Report No.(s): Paper 15; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The term operational stress injury is unique to the Canadian Forces. It defines any persistent psychological difficulty resulting from operational duties performed by a Canadian Forces member. These psychological difficulties can include mood disorders, anxiety disorders, adjustment disorders, psychotic disorders and others. Of this wide range of conditions, this paper shall focus primarily on acute and chronic stress reactions, acute stress disorder, posttraumatic stress disorder and combat stress reaction. This paper shall demonstrate that military leaders can mitigate operational stress injuries through a system of

preventive and responsive care. To demonstrate this thesis, a lexicon of stress shall be defined that embodies both a traditional and Canadian Forces conceptualization of stress reactions and disorders. The history of stress in military operations shall be examined to expose some of the time-honoured misconceptions surrounding operational stress and some of the early and important roles played by military leaders to address the problem. Following this historical analysis, the medical science behind operational stress injuries will be reviewed. Finally, having drawn upon medical science and lessons from the past, this paper shall demonstrate that military leaders can mitigate operational stress injuries through the practice of preventive care and, when prevention fails, through the facilitation of responsive treatment.

Author

Military Operations; Medical Science; Injuries; Prevention; Psychological Factors; Leadership; Combat

20080010132 Mullin-Splude (Bernadine), Bedford, Nova Scotia, Canada

The Experience of Community in Canadian Military Families: A Female Partners' Perspective

Mullin-Splude, Bernadine; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 20B-1 - 20B-8; In English; See also [20080010087](#)

Report No.(s): Paper 20B; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This is a condensed version of my thesis successfully defended Spring, 2004. The question of how Canadian military families experience community arose from my employment with the Halifax Military Family Resource Centre and my position in deployment services. The literature review covered the topics of Community, Military Families and Social Support. The emerging questions dealt with matters of meaning and perception of community for the female military partners. This led to a study using qualitative research. The paradigm guiding this thesis is Critical Theory. The ensuing deconstruction of military culture revealed pervasive ideologies impacting on the everyday lives of the military family. Ethnomethodology was used to focus on how members accomplish, manage and reproduce a sense of social structure. It is a subjective and interpretive study. The stories of 7 female military partners produce emerging data leading to categorized themes from which implications, conclusions and recommendations have been drawn.

Author

Deployment; Norms; Military Personnel; Identities; Support Systems; Military Operations; Mental Health; Children; Ethics

20080010133 French Army Staff, Armees, France

French Army - Family Psychological and Social Support

Bouillaud, G.; Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support; April 2006, pp. 21E-1 - 21E-8; In English; See also [20080010087](#)

Report No.(s): Paper 21E; Copyright; Avail.: CASI: [A02](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The French Army is permanently engaged on different theatres of operations. Our units are regularly projected and the professionalism of our soldiers is recognised. But it is important that their close relatives, confronted with the absence of a loved one, are supported within our units and backed up when they wish so. As of 1996, the French Army created the recruitment retraining and quality of life departments (BRRC), which constitute a proximity support for the families. The Army currently wants to improve the efficiency of the set up by developing the aid to parents and couples. Indeed, in order to meet the expectations of the families, it bases its reflection on three inquiries carried out during the year 2005: a) The consequences of missions outside the national territory on the families (ARIA); b) The expectations of Army personnel in terms of social allowances (EMAT/CRH) (Army Staff/Quality of life); c) The aid to the families of military personnel in operations outside the national territory (EMAT/CRH). This support set up comes within the scope of an approach aimed at establishing a contract between the institution, the military and his/her family. The objective of the command is to define the nature of the provided support and to be able to carry out its engagement. This moral and formal contract will result in a still more solid relation based on confidence and on a cohesion spirit. Thus, the Army Staff/Quality of life is carrying out a reflection on the organisation of the accompaniment and the psychological and social support of the families of the military personnel when in operations outside the national territory and in short duration missions. The psychological and social support proposed to the families of military personnel deployed outside the national territory and in short duration missions participates in the operational capability and remains a priority of the military condition, fully assumed by the command and under the responsibility of the commanding officers.

Author

Military Personnel; Psychological Factors; Support Systems; Deployment

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*.

20080009764 NASA Johnson Space Center, Houston, TX, USA; Jacobs Technologies Engineering Science Contract Group (ESCG), Houston, TX, USA

Lunar Outpost Technologies Breakeven Study

Perka, Alan; January 17, 2008; 33 pp.; In English; SIMA Telecon, 17 Jan. 2008, Houston, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): NNNJ05H105C; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009764>

This viewgraph presentation compares several Lunar Outpost (LO) life support technology combinations, evaluates the combinations for two clothing options, (i.e., Disposable clothing, and using Laundry to clean the soiled clothing) and evaluates the use of the Advanced Life Support Sizing and Analysis Tool (ALSSAT) to estimate Equivalent System Mass (ESM) CASI

Life Support Systems; Lunar Bases; Water; Lunar Logistics

20080009844 Industrial Coll. of the Armed Forces, Washington, DC USA

Biotechnology Industry, 2006

Jan 2006; 31 pp.; In English

Report No.(s): AD-A475300; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475300>

The USA leads the world in biotechnology, centered on genetic engineering at the cellular or molecular level, a process which applies across a range of products in diverse industries, just as computer engineering does. The biotech industry is becoming a major player in many sectors, including medicine, agriculture, energy, defense, the environment, and nanotechnology. Genetically modified (GM) foods are feeding millions. GM bacteria and plants are cleaning up pollution quietly and cheaply. The nation depends on biotechnology for defense against terrorist attacks and pandemic influenzas. Stem cells promise the miracle of tissue regeneration. As an industry, though, biotechnology is still emerging, driven by the promise of research which for many companies has yet to yield products or profits. The industry relies on government to a surprising degree for support of basic science and for regulations that can either free up or stifle growth: property rights (patents), clinical trials, litigation relief, and ethical guidelines. Only an informed public will allow biotechnology to flourish, because it leans so strongly on legislation, because it is pushing into ethical dilemmas no one has faced before, and because it can either develop or defend against biological weapons and environmental risks. However, the shortage of U.S. scientists and engineers with advanced degrees in biotechnology means the industry depends on foreign researchers, which could easily threaten future preeminence. Establishing a National Biotechnology Council would facilitate federal collaboration. Biotechnology has already had an impact on our lives on an unprecedented scale, and there is every indication the future holds much more.

DTIC

Biotechnology; Industries

20080009867 Army Aeromedical Research Lab., Fort Rucker, AL USA

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS)

Brozoski, Frederick; Padgett, Katie; Lindsey, James; Dec 2007; 37 pp.; In English

Report No.(s): AD-A475373; USAARL-2008-04; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475373>

The USAARL was tasked by the Product Manager, Air Warrior, to evaluate the Aqualung Portable Helicopter Oxygen Delivery System (PHODS). The objectives were to assess the blunt impact protection and mass properties of the HGU-56/P helmets modified with the PHODS nasal cannula. Six small HGU-56/P helmets were modified with nasal cannulas and subjected to blunt eardome impacts per the HGU-56/P product specification. Mass and center of mass (CM) assessments were performed using one large HGU-56/P helmet modified with a nasal cannula. Modified HGU-56/P helmets limited headform accelerations to less than the 150-G criterion during eardome impacts. Thus, HGU-56/P helmets modified with the PHODS nasal cannula should provide adequate lateral impact protection in survivable rotary-wing mishaps. Installing the PHODS nasal cannula on the HGU-56/P flight helmet increased helmet weight and altered helmet CM position. The additional mass

and change in CM did not appreciably increase the risk of sustaining acute lower neck injury for the conditions evaluated.
DTIC

Cannulae; Evaluation; Flight Clothing; Flight Crews; Helicopters; Helmets; Installing; Oxygen; Oxygen Supply Equipment; Protection; System Effectiveness; Systems Integration

20080010628 NASA Johnson Space Center, Houston, TX, USA

Information Presentation

Holden, Kritina; Sandor, A.; Thompson, S. G.; McCann, R. S.; Kaiser, M. K.; Begault, D. R.; Adelstein, B. D.; Beutter, B. R.; Stone, L. S.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The goal of the Information Presentation Directed Research Project (DRP) is to address design questions related to the presentation of information to the crew on flight vehicles, surface landers and habitats, and during extra-vehicular activities (EVA). Designers of displays and controls for exploration missions must be prepared to select the text formats, label styles, alarms, electronic procedure designs, and cursor control devices that provide for optimal crew performance on exploration tasks. The major areas of work, or subtasks, within the Information Presentation DRP are: 1) Controls, 2) Displays, 3) Procedures, and 4) EVA Operations.

Author

Control Equipment; Information Systems; Display Devices; Systems Engineering

20080010633 NASA Johnson Space Center, Houston, TX, USA

Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight

Feiveson, Alan H.; Wood, Scott J.; Jain, Varsha; [2008]; 1 pp.; In English; Joint Statistical Meeting, 3-7 Aug. 2008, Denver, Co, USA; Copyright; Avail.: Other Sources; Abstract Only

Astronauts show degraded balance control immediately after spaceflight. To assess this change, astronauts' ability to maintain a fixed stance under several challenging stimuli on a movable platform is quantified by 'equilibrium' scores (EQs) on a scale of 0 to 100, where 100 represents perfect control (sway angle of 0) and 0 represents data loss where no sway angle is observed because the subject has to be restrained from falling. By comparing post- to pre-flight EQs for actual astronauts vs. controls, we built a classifier for deciding when an astronaut has recovered. Future diagnostic performance depends both on the sampling distribution of the classifier as well as the distribution of its input data. Taking this into consideration, we constructed a predictive ROC by simulation after modeling $P(EQ = 0)$ in terms of a latent EQ-like beta-distributed random variable with random effects.

Author

Balance; Manned Space Flight; Equilibrium; Mathematical Models

20080010651 NASA Johnson Space Center, Houston, TX, USA

Derivation of Boundary Manikins: A Principal Component Analysis

Young, Karen; Margerum, Sarah; Barr, Abbe; Ferrer, Mike A.; Rajulu, Sudhakar; [2008]; 4 pp.; In English; Digital Human Modeling Conference 2008, 17-19 Jun. 2008, Pittsburgh, PA, USA; Original contains color illustrations

Report No.(s): 08DHM-0099; Copyright; Avail.: Other Sources

When designing any human-system interface, it is critical to provide realistic anthropometry to properly represent how a person fits within a given space. This study aimed to identify a minimum number of boundary manikins or representative models of subjects anthropometry from a target population, which would realistically represent the population. The boundary manikin anthropometry was derived using, Principal Component Analysis (PCA). PCA is a statistical approach to reduce a multi-dimensional dataset using eigenvectors and eigenvalues. The measurements used in the PCA were identified as those measurements critical for suit and cockpit design. The PCA yielded a total of 26 manikins per gender, as well as their anthropometry from the target population. Reduction techniques were implemented to reduce this number further with a final result of 20 female and 22 male subjects. The anthropometry of the boundary manikins was then be used to create 3D digital models (to be discussed in subsequent papers) intended for use by designers to test components of their space suit design, to verify that the requirements specified in the Human Systems Integration Requirements (HSIR) document are met. The end-goal is to allow for designers to generate suits which accommodate the diverse anthropometry of the user population.

Author

Principal Components Analysis; Anthropometry; Systems Integration; Human Factors Engineering

20080010652 NASA Johnson Space Center, Houston, TX, USA

Applications of Human Factors in Space

Rajulu, Sudhakar; Margerum, Sarah; [2008]; 5 pp.; In English; Human Factors and Ergonomics Society Conference, 22-26 Sep. 2008, Manhattan, NY, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The main question for human factors practitioners is to determine if the user population can be accommodated within a design. Given the wide range of variables feeding into a design, just one of which is human factors, oftentimes designers will have restrictions that may potentially impact the level of accommodation. This paper focuses on two case studies where there have been impacts at the design level that may be detrimental to the ability of the design to meet certain criteria. The studies use novel approaches to determine what, if any, changes in population accommodation levels have occurred and what factors are important when manipulating the design in the future. The results of these studies provide a backbone for future analyses when working with design considerations.

Author

Human Factors Engineering; Biodynamics; Anthropometry; Astronauts

20080010653 NASA Johnson Space Center, Houston, TX, USA

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads

Carr, Daniel; Ellenberger, Rich; [2008]; 5 pp.; In English; Human Factors Ergonomics Society Conference, 22-26 Sep. 2008, Manhattan, NY, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Human Factors Implementation Team (HFIT) process has been used to verify human factors requirements for NASA International Space Station (ISS) payloads since 2003, resulting in \$2.4 million in avoided costs. This cost benefit has been realized by greatly reducing the need to process time-consuming formal waivers (exceptions) for individual requirements violations. The HFIT team, which includes astronauts and their technical staff, acts as the single source for human factors requirements integration of payloads. HFIT has the authority to provide inputs during early design phases, thus eliminating many potential requirements violations in a cost-effective manner. In those instances where it is not economically or technically feasible to meet the precise metric of a given requirement, HFIT can work with the payload engineers to develop common sense solutions and formally document that the resulting payload design does not materially affect the astronaut's ability to operate and interact with the payload. The HFIT process is fully ISO 9000 compliant and works concurrently with NASA's formal systems engineering work flow. Due to its success with payloads, the HFIT process is being adapted and extended to ISS systems hardware. Key aspects of this process are also being considered for NASA's Space Shuttle replacement, the Crew Exploration Vehicle.

Author

Human Factors Engineering; International Space Station; Space Station Payloads; Systems Engineering; Life Cycle Costs

20080010654 NASA Johnson Space Center, Houston, TX, USA

Population Analysis: Communicating in Context

Rajulu, Sudhakar; Thaxton, Sherry; [2008]; 6 pp.; In English; Human Factors and Ergonomics Society Conference, 22-26 Sep. 2008, Manhattan, NY, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A02](#), Hardcopy

Providing accommodation to a widely varying user population presents a challenge to engineers and designers. It is often even difficult to quantify who is accommodated and who is not accommodated by designs, especially for equipment with multiple critical anthropometric dimensions. An approach to communicating levels of accommodation referred to as population analysis applies existing human factors techniques in novel ways. This paper discusses the definition of population analysis as well as major applications and case studies. The major applications of population analysis consist of providing accommodation information for multivariate problems and enhancing the value of feedback from human-in-the-loop testing. The results of these analyses range from the provision of specific accommodation percentages of the user population to recommendations of design specifications based on quantitative data. Such feedback is invaluable to designers and results in the design of products that accommodate the intended user population.

Author

Human Factors Engineering; Populations; Anthropometry; Systems Engineering; Biodynamics

20080010655 NASA Johnson Space Center, Houston, TX, USA

Human Factors Engineering Standards at NASA

Russo, Dane; Tillman, Barry; Pickett, Lynn; [2008]; 2 pp.; In English; Human Factors and Ergonomics Society Conference, 22-26 Sep. 2008, Manhattan, NY, USA; Copyright; Avail.: CASI: [A01](#), Hardcopy

NASA has begun a new approach to human factors design standards. For years NASA-STD-3000, Manned Systems

Integration Standards, has been a source of human factors design guidance for space systems. In order to better meet the needs of the system developers, NASA is revising its human factors standards system. NASA-STD-3000 will be replaced by two documents: set of broad human systems design standards (including both human factors and medical topics) and a human factors design handbook. At the present time the standards document is in final review with some disagreement on several critical issues. The handbook is progressing with November 2008 as the anticipated completion date.

Author

Human Factors Engineering; Manned Space Flight; Aerospace Systems; Standards; Systems Integration

20080010711 NASA Johnson Space Center, Houston, TX, USA

A Testbed for Evaluating Lunar Habitat Autonomy Architectures

Lawler, Dennis G.; February 10, 2008; 1 pp.; In English; Space Technology and Applications International 2008, 10-14 Feb. 2008, Albuquerque, NM, USA; No Copyright; Avail.: Other Sources; Abstract Only

A lunar outpost will involve a habitat with an integrated set of hardware and software that will maintain a safe environment for human activities. There is a desire for a paradigm shift whereby crew will be the primary mission operators, not ground controllers. There will also be significant periods when the outpost is uncrewed. This will require that significant automation software be resident in the habitat to maintain all system functions and respond to faults. JSC is developing a testbed to allow for early testing and evaluation of different autonomy architectures. This will allow evaluation of different software configurations in order to: 1) understand different operational concepts; 2) assess the impact of failures and perturbations on the system; and 3) mitigate software and hardware integration risks. The testbed will provide an environment in which habitat hardware simulations can interact with autonomous control software. Faults can be injected into the simulations and different mission scenarios can be scripted. The testbed allows for logging, replaying and re-initializing mission scenarios. An initial testbed configuration has been developed by combining an existing life support simulation and an existing simulation of the space station power distribution system. Results from this initial configuration will be presented along with suggested requirements and designs for the incremental development of a more sophisticated lunar habitat testbed.

Author

Lunar Bases; Habitats; Space Station Power Supplies; Life Support Systems; Autonomy

20080010820 China Astronaut Research and Training Center, Beijing, China

Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments

Tang, Yong-kang; Guo, Shuang-sheng; Wei-dang, Ai; Qin, Li-feng; Space Medicine and Medical Engineering, Volume 20, No. 5; October 2007, pp. 339-343; In Chinese; See also [20080010817](#); Copyright; Avail.: Other Sources

The objectives of this work are to develop a space ethylene filter (SEF) prototype facility for use in ground-based experiments, so as to remove the contaminants (C₂H₄) originated from higher plants in controlled ecological life support system (CELSS), which may inhibit the growth and development of higher plants. Methods The blueprint design, machining of components, facility installment, debugging, trial operations and verification experiments were carried out according to detailed demonstration of the technical plan. Results The parameters in the substrate, such as temperature, water content, pH and air flux, relative humidity of air were all monitored and controlled effectively, the results of verification experiments demonstrated that this facility could degrade C₂H₄ by 9.04 mg/(m³ * h). Conclusion Its main technical indexes meet the design requirement. It works stably and can be used to remove C₂H₄ and other contaminants in CELSS.

Author (revised)

Closed Ecological Systems; Ethylene; Life Support Systems; Plant Growth Regulators

20080010879 NASA Johnson Space Center, Houston, TX, USA

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements

England, Scott A.; Benson, Elizabeth A.; Rajulu, Sudhakar; [June 25, 2008]; 2 pp.; In English; 2008 Summer Bioengineering Conference, 25-29 Jun. 2008, Marco Island, FL, USA; Copyright; Avail.: CASI: [A01](#), Hardcopy

Across all fields of human-system interface design it is vital to possess a sound methodology dictating the constraints on the system based on the capabilities of the human user. These limitations may be based on strength, mobility, dexterity, cognitive ability, etc. and combinations thereof. Data collected in an isolated environment to determine, for example, maximal strength or maximal range of motion would indeed be adequate for establishing not-to-exceed type design limitations, however these restraints on the system may be excessive over what is basally needed. Resources may potentially be saved by having a technique to determine the minimum measurements a system must accommodate. This paper specifically deals with the creation of a novel methodology for establishing mobility requirements for a new generation of space suit design concepts.

Historically, the Space Shuttle and the International Space Station vehicle and space hardware design requirements documents such as the Man-Systems Integration Standards and International Space Station Flight Crew Integration Standard explicitly stated that the designers should strive to provide the maximum joint range of motion capabilities exhibited by a minimally clothed human subject. In the course of developing the Human-Systems Integration Requirements (HSIR) for the new space exploration initiative (Constellation), an effort was made to redefine the mobility requirements in the interest of safety and cost. Systems designed for manned space exploration can receive compounded gains from simplified designs that are both initially less expensive to produce and lighter, thereby, cheaper to launch.

Derived from text

Human-Computer Interface; Systems Integration; Motion; Bioengineering; Requirements

20080010882 NASA Johnson Space Center, Houston, TX, USA

The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion

Greenisen, M. C.; Bishop, P. A.; Sothmann, M.; [2008]; 2 pp.; In English; 29th TACSM Annual Meeting, 29 Feb.?1 Mar. 2008, Odessa, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

The purpose of this study was to determine the consequences of extended periods of weightlessness during space missions on astronauts' ability to perform a simulated contingency egress while wearing either of the Launch and Entry suits immediately after space flight. In our previous lab-based study of simulated contingency egress, we found only 4 of 12 non-astronauts wearing the Launch and Entry Suit (LES) successfully completed the simulated egress. However, 4 of 4 of the previous failures (when tested wearing the LES), were then successful in completing the test wearing the Advanced Crew Escape Suit (ACES). Therefore, this study tested 21 Astronaut Volunteers wearing either the LES or ACES while performing a simulated egress on a treadmill (TM) onboard the Crew Transportation Vehicle immediately after space flight at either the Kennedy Space Center or Edwards AFB. Astronauts walked for 400 meters at 1.6m/sec with g-suit inflation level set to preflight testing levels, visor down, breathing from the suit emergency O₂ supply. Metabolic, heart rate, and perceived exertion data were collected during these post-flight tests. Exactly the same preflight simulated egress tests on a TM were performed in the lab at NASA/JSC by each crewmember at L-60. Preflight testing found 2 of the 21 crewmembers were unable to complete the simulated contingency egress. Postflight, 9 crew (8 ACES, 1 LES) completed the simulated contingency egress of 400 meters at 1.6m/sec. and 12 failed to meet that standard (7 ACES, 5 LES). Preflight physiological response tests failed to identify crew capable of performing the egress vs. those who failed. However, 18 of the 21 crew did make at least 2.67 minutes into the postflight egress testing. At that point in time, heart rate was higher ($P \leq .20$) for the failures compared to the finishers. These findings indicate that NASA's switch to the ACES for space flight crews should be expedited.

Author

Astronaut Locomotion; Egress; Space Shuttles; Space Suits

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*.

20080009671 National Chung Hsing Univ., Taichung, Taiwan, Province of China

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues

Liu, Chia-Lung; Tsaur, Ding-Jyh; Wu, Chin-Chi; Lin, Woei; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 689-701; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

When buffer resources are deployed in the switch, shared-memory based packet switches are known to supply the best possible performance for bursty data traffic in networks and the Internet. Nevertheless, scaling of shared-memory packet switches to larger sizes has been limited and then packets can not be processed in a high speed network, chiefly because of the physical restrictions imposed by the memory operation rate and the centralized strategy for switching functions in shared-memory switches. In this investigation, a scalable switch for a high speed network, which is called the parallel packet switch (PPS), is studied to overcome these constraints. The PPS comprises n -multiple packet switches operating independently and in parallel. The PPS class is characterized by the deployment of parallel center-stage switches with memory buffers running slower than the external line rate. Each lower speed packet switch operates at a fraction of the external line rate R . For example, each packet switch can operate at an internal line rate RIK , where K is the number of center-stage switches. This study develops and investigates a PPS which distributes cells or variable-length packets to low-speed switches and uses

outputs with push-in arbitrary-out (PIAO) queues. We present a novel Markov chain model that successfully analyzes and exhibits PPS performance characteristics for throughput, cell delay and cell drop rate. Simulation comparison demonstrates that the developed Markov chain model is accurate for practical network loads and the PPS with PIAO queues provides considerably better performance than previously known classes of shared-memory switch architecture. Key Words: parallel packet switch, shared-memory based packet switch, Markov chain, push-in arbitrary-out queues

Author

Packet Switching; Markov Chains; Memory (Computers); Architecture (Computers); Deployment; Low Speed; Switching; Performance Prediction

20080009672 National Chung Hsing Univ., Taichung, Taiwan, Province of China

A Sliding-Window Parallel Packet Switch for High-speed Networks

Liu, Chia-Lung; Wu, Chin-Chi; Lin, Woei; Journal of the Chinese Institute of Engineers, Volume 30, No. 4; June 2007, pp. 717-730; In English; See also [20080009667](#); Copyright; Avail.: Other Sources

This paper analyzes the performance of a parallel packet switch (PPS) with a sliding window (SW). The PPS involves numerous packet switches that operate independently and in parallel. The conventional PPS dispatch algorithm adopts a round-robin (RR) method. The class of PPS is characterized by deployment of parallel low-speed switches whose memory buffers run more slowly than the external line rate. In this work, a novel SW packet switching method for PPS, called SW-PPS, is proposed. The SW-PPS employs memory space more effectively than the existing PPS using an RR algorithm. Under identical Bernoulli and bursty data traffic, the SW-PPS provided significantly improved performance when compared to PPS with RR. Moreover, this investigation presents a novel mathematical analytical model to evaluate the performance of the PPS using RR and SW. Under various operating conditions, our proposed model and analysis successfully exhibit performance characteristics including throughput, cell delay, and cell drop rate.

Author

Packet Switching; Computer Networks; High Speed; Algorithms; Mathematical Models; Deployment

20080009782 NASA Johnson Space Center, Houston, TX, USA

Human Factors in Human-Systems Integration

Fitts, David J.; Sandor, Aniko; Litaker, Harry L., Jr.; Tillman, Barry; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Any large organization whose mission is to design and develop systems for humans, and train humans needs a well-developed integration and process plan to deal with the challenges that arise from managing multiple subsystems. Human capabilities, skills, and needs must be considered early in the design and development process, and must be continuously considered throughout the development lifecycle. This integration of human needs within system design is typically formalized through a Human-Systems Integration (HSI) program. By having an HSI program, an institution or organization can reduce lifecycle costs and increase the efficiency, usability, and quality of its products because human needs have been considered from the beginning.

Author

Human Factors Engineering; Systems Integration; Human Performance

20080010864 Research and Technology Organization, Neuilly-sur-Seine, France

Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II

December 2006; In English; Lecture Series, 12-13 May 2005, Stockholm, Sweden; See also [20080010865](#) - [20080010868](#); Original contains color and black and white illustrations

Report No.(s): RTO-EN-SCI-166-Pt-2; AC/323(SCI-166)TP/81-Pt-2; Copyright; Avail.: CASI: [C01](#), CD-ROM

Topics covered include: Quantitative Robust Control Engineering: Theory and Applications; Advanced Control Law Tuning and Performance Assessment; Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants; and Data-Driven Robust Control Design: Unfalsified Control.

Derived from text

Systems Integration; Uncertain Systems; Control Theory; Predictions; Tuning

20080010865 University of Southern California, Los Angeles, CA, USA

Data-Driven Robust Control Design: Unfalsified Control

Safonov, Michael G.; Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II; December 2006, pp. 4-1 - 4-18; In English; See also [20080010864](#); Original contains color and black and white illustrations

Report No.(s): Paper 4; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Aerospace applications require precise control despite uncertain operating conditions and unanticipated circumstances such as battle damage. These systems must be designed to perform robustly, despite uncertain design models and difficult to analyze nonlinear effects. They must be capable of learning and adapting when accumulating data indicates that previous models must be abandoned and that existing control strategies must be changed. Data-driven design methods, collectively known as un-falsified control theory, facilitate the creation of robust control systems that learn, discover and evolve in real time in order to rapidly switch controller gains to compensate for the effects of battle, equipment failures, and other changing circumstances. Applications studies will be presented that include adaptive robot arm control and missile control.

Author

Real Time Operation; Adaptive Control; Control Theory; Controllers; Aerospace Engineering; Nonlinearity

20080010866 Public Univ. of Navarre, Pamplona, Spain

Quantitative Robust Control Engineering: Theory and Applications

Garcia-Sanz, Mario; Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II; December 2006, pp. 1-1 - 1-44; In English; See also [20080010864](#); Original contains color and black and white illustrations

Contract(s)/Grant(s): CICYT DPI'2003-08580-C02-01

Report No.(s): Paper 1; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper presents a summary of the main concepts and references of the Quantitative Feedback Theory (QFT). It is a frequency domain engineering method to design robust controllers. It explicitly emphasises the use of feedback to simultaneously reduce the effects of model plant uncertainty and to satisfy performance specifications. QFT highlights the trade-off (quantification) among the simplicity of the controller structure, the minimization of the cost of feedback, the existing model uncertainty and the achievement of the desired performance specifications at every frequency of interest. The technique has been successfully applied to control a wide variety of physical systems. After a brief introduction about the essential aspects of the QFT design methodology, including a wide set of QFT references, this paper presents a new method to extend the classical diagonal QFT controller design method for MIMO plants with model uncertainty to a fully populated matrix controller design method. The paper simultaneously studies three cases: the reference tracking, the external disturbance rejection at plant input and the external disturbance rejection at plant output. The work ends showing several real-world examples where the controllers have been designed using QFT techniques: an industrial SCARA robot manipulator, a wastewater treatment plant, a variable speed wind turbine of 1.65 MW and an industrial furnace of 1 MW.

Author

Control Theory; Robustness (Mathematics); Performance Prediction; Robot Arms; MIMO (Control Systems); Functional Design Specifications; Controllers

20080010867 Strathclyde Univ., Glasgow, UK

Advanced Control Law Tuning and Performance Assessment

Grimble, Michael J.; Majecki, Pawel; Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II; December 2006, pp. 2-1 - 2-42; In English; See also [20080010864](#); Original contains color and black and white illustrations

Report No.(s): Paper 2; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

It is evident that military applications for 21st century will be highly complex, multivariable systems. Designing optimal controllers for such applications will require the use of mathematical models which describe the complexity of the underlying processes as accurately as possible. For robustness it is essential that these models include the uncertainties in the estimated process dynamics and trajectories. Controllers resulting from optimal control strategies (like LQG, H2, H8) will usually be of very high order and that can cause implementation and computational problems. Some of these problems can be overcome by using controllers that are of lower order and restricted structure. The subject of restricted structure controller design and

performance assessment is relatively new and enables the expected performance to be assessed against a much more realistic criterion. That is, the performance figures take into account the limitations of the existing control system structure, and hence provide a more accurate measure of the possible performance improvement. However, the design and/or tuning of restricted-structure controllers in order to provide the performance comparable with full-order solutions is still a very contentious issue. Added to this is the need to achieve robust properties and performance specifications required by military applications. Very few methods for designing restricted-structure controllers exist that allow the performance and robustness objectives to be combined into one relatively simple optimisation problem. This lecture presents an LQG/H2-based method that tackles the above mentioned issues. This work also provides the exciting possibility of enabling the multivariable structures of systems to be assessed. Thus for example, it is possible to check whether a diagonal multivariable controller, upper triangular, lower triangular or sparser structures might be almost as good as a full multivariable control law. This technique provides advantages over the commonly used technique of so called relative gain array for judging the best structure for a multivariable system. All these techniques are applicable to continuous or discrete-

Author

Complex Systems; Optimal Control; Control Theory; Functional Design Specifications; Linear Quadratic Gaussian Control; Multivariable Control; Tuning; Robustness (Mathematics)

20080010868 Florence Univ., Italy

Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants

Mosca, Edoardo; Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II; December 2006, pp. 3-1 - 3-14; In English; See also [20080010864](#); Original contains black and white illustrations Report No.(s): Paper 3; Copyright; Avail.: CASI: [A03](#), Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In order to provide computationally affordable predictive control algorithms, predictive switching logic schemes are considered whereby a feedback-gain is switched-on at any time from a family of candidate feedback-gains so as to control a discrete-time input-saturated LTI system possibly subject to persistent bounded disturbances of unknown arbitrary magnitude. It is constructively shown that such schemes do exist which ensure, along with good tracking performance, global asymptotic and semi-global exponential stability in the noiseless case, as well as finite l_8 -induced gain to the disturbance-to-state map, whenever the structure of the disturbed plant can make such properties conceptually achievable. Key words: Switching control; Predictive control; Control of input-saturated systems; Anti-windup control; Nonlinear control.

Author

Control Systems Design; Uncertain Systems; Switching; Sequential Control; Algorithms; Predictions

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*.

20080010000 Princeton Univ., NJ USA

A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry

Howard, Stephen D; Calderbank, A R; Moran, William; Nov 2006; 9 pp.; In English

Contract(s)/Grant(s): HR0011-0501-0030; FA9550-04-1-0431

Report No.(s): AD-A475601; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This paper describes a new radar primitive that enables instantaneous radar polarimetry at essentially no increase in signal processing complexity. This primitive coordinates transmission of distinct waveforms on orthogonal polarizations and applies a unitary matched filter bank on receive. This avoids the information loss inherent in single-channel matched filters. A further advantage of this scheme is the elimination of range sidelobes.

DTIC

Architecture (Computers); Polarimetry; Radar; Signal Processing

20080010869 Naval Postgraduate School, Monterey, CA USA

SecureCore Software Architecture: Trusted Path Application (TPA) Requirements

Clark, Paul C; Irvine, Cynthia E; Levin, Timothy E; Nguyen, Thuy D; Vidas, Timothy M; Dec 2007; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): CNS-0430566; CNS-0430598

Report No.(s): AD-A475308; NPS-CS-07-001; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475308>

A mobile computing device has more inherent risk than desktops or most other stationary computing devices. Such mobile devices are typically carried outside of a controlled physical environment, and they must communicate over an insecure medium. The risk is even greater if the data being stored, processed and transmitted by the mobile device is classified. The purpose of the SecureCore research project is to investigate fundamental architectural features required for the trusted operation of mobile computing devices so the security is built-in, transparent and flexible. A high-level architecture is described to provide such features. In addition, a usage scenario is described for a potential use of the architecture, with emphasis on the trusted path, a non-spoofable user interface to the trusted components of the system. Detailed requirements for the trusted path are provided.

DTIC

Architecture (Computers); Software Engineering; Computer Information Security; Requirements

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.

20080009841 Defence Research and Development Canada, Valcartier, Quebec Canada

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension

Charland, Philippe; Ouellet, David; Dessureault, Dany; Lizotte, Michel; Oct 2007; 96 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475292; DRDC-V-TM-2006-732; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475292>

With the increasing needs of the Canadian Forces (CF) for systems interoperability, techniques and tools have to be developed in order to build systems of systems (SoS), i.e., systems whose components are themselves independent systems from an operational and managerial viewpoint. However, before existing systems can interoperate, their architectures first need to be recovered and comprehended. This technical memorandum describes the functional decomposition of an integrated suite of tools to assist with software system architecture recovery and comprehension. It was designed based on the requirements already identified in the scientific literature for comprehension tools, on a qualitative study conducted using existing tools, as well as on a state-of-the-art survey on system architecture recovery and comprehension. Following the conception of this functional decomposition, a prototype implementing it will be developed into an integrated development environment (IDE) to assist the CF in recovering and comprehending the architecture of already existing software systems.

DTIC

Computer Programming; Decomposition; Software Engineering; Support Systems

20080009850 Defence Research and Development Canada, Valcartier, Quebec Canada

RAP Simulation Environment Characteristics

Allouche, Mohamad; Belanger, Micheline; Maupin, Patrick; Jan 2007; 68 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475322; DRDC-V-TM-2006-702; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475322>

The Recognized Air Picture (RAP) is an important element of Air Force operations which can be associated with the Common Operational Picture (COP). With the Common Tactical Picture (CTP), they provide Air Force commanders with the necessary situation awareness (SA), indicating, in real time, the status of deployed friendly and enemy assets. In the 13dw project, DRDC Valcartier investigated concepts that could improve the implementation of a dynamic RAP and its exploitation for the management of Canadian Air Force resources in real-time operations. Such an implementation requires the definition of a reference scenario and the development of a simulation tool. On the one hand, an analysis of five existing scenarios led

to the choice of the North Atlantis scenario, on top of which depicting a Combat Search and Rescue (CSAR) mission vignette was developed. On the other hand, the analysis of some existing simulation tools (two commercial tools and two R&D tools designed at DRDC Valcartier) led to recommendations for the development of a dynamic RAP tool.

DTIC

Canada; Computerized Simulation; Images; Military Operations; Simulation; Situational Awareness

20080009856 Defence Research and Development Canada, Valcartier, Quebec Canada

Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation

Charland, Philippe; Dessureault, Dany; Ouellet, David; Lizotte, Michel; Nov 2007; 68 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475341; DRDC-V-TM-2006-781; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475341>

Although there already exist tools to assist in understanding the behavior of software systems when no complete and consistent design models are available, these tools generate a large volume of information. One approach to deal with this problem is information hiding. This technical memorandum presents a prototype which implements this technique to reverse engineer dynamic models from Java software systems. These models are represented using Unified Modeling Language (UML) sequence diagrams. Such diagrams show the interactions, in terms of messages or information transfers, between the operational nodes of a system, arranged in a time sequence. Information hiding is achieved by reconstructing the sequence diagrams at various levels of abstraction. The interactions between the operational nodes of a system can be displayed at a low level, i.e., object level. However, related operational nodes can also be regrouped into higher level structures, i.e., packages. The proposed approach was implemented in Eclipse, an extensible integrated development environment (IDE). The objective is to complement the behavioral views reverse engineered by the implemented prototype with structure views generated by other tools.

DTIC

Architecture (Computers); Prototypes; Software Development Tools

20080009879 Center of Standardization for Army Family Housing, Norfolk, VA USA

LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing

Bobotas, Lisa; Hinson, Matt; Christensen, Paul; Headley, Gary; Schneider, Rich; Stumpf, Annette; Nov 2007; 66 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475401; ERDC/CERL TR-07-45; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475401>

Army participation in the LEED(registered name) for Homes Pilot Program is intended to facilitate preparations and transition from SPiRiT to LEED for Homes as soon as it is ready for adoption. The pilot program will coincide with U.S. Green Building Council (USGBC) development of the LEED for Homes evaluation tool. The Office of the Assistant Chief of Staff (Installation Management) Housing Division has overall responsibility for the transition and has selected Norfolk District, Center of Standardization for Family Housing to facilitate and coordinate participation in the LEED for Homes Pilot Program. A team consisting of Army personnel experienced in Army Family Housing (AFH) and/or sustainability conducted site visits to AFH at Fort Lee, VA and Fort Huachuca, AZ. Both installations have a history of successful AFH projects and current projects under construction that used SPiRiT as a sustainability rating tool. LEED for Homes was applied to each AFH project. Further, each credit was evaluated for applicability to Army projects and its ease of application using current design guidelines. Where appropriate, feedback was provided to the USGBC regarding issues, concerns, or clarifications on particular credits. The team also defined several Innovation and Design credits that could universally apply to AFH projects.

DTIC

Design Analysis; Software Development Tools

20080009951 Texas Univ., Austin, TX USA

Maximizing the Benefits of Training by Example and Direct Instruction

Love, Bradley C; Jan 8, 2008; 11 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0226; Proj-2313

Report No.(s): AD-A475484; No Copyright; Avail.: Defense Technical Information Center (DTIC)

One major accomplishment in this project was the development of the CLUSTER Error Reduction (CLUSTER) model's formalism. The updated equations can be downloaded at <http://love.psy.utexas.edu/~love/cluster.pdf>. One popular approach to

modeling human category learning in the face of challenging data has been to propose models containing multiple systems. These systems could include prototype, exemplar, or rule-based components, as well as gating mechanisms that determine how to combine the outputs from these systems or components. CLUSTER takes a complex systems approach in which 'systems' emerge out of the learners interactions with their environment. One claim is that what appears as separate cognitive systems are all based on cluster representations that follow from CLUSTER's recruitment and learning rules.

DTIC

Education; Errors

20080009992 Space and Naval Warfare Systems Center, San Diego, CA USA

Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing

Sights, B; Ahuja, G; Kogut, G; Pacis, E B; Everett, H R; Fellars, D; Hardjadinata, S; Jan 2007; 12 pp.; In English
Report No.(s): AD-A475584; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The fusion of multiple behavior commands and sensor data into intelligent and cohesive robotic movement has been the focus of robot research for many years. Sequencing low level behaviors to create high level intelligence has also been researched extensively. Cohesive robotic movement is also dependent on other factors, such as environment, user intent, and perception of the environment. In this paper, a method for managing the complexity derived from the increase in sensors and perceptions is described. Our system uses fuzzy logic and a state machine to fuse multiple behaviors into an optimal response based on the robot's current task. The resulting fused behavior is filtered through fuzzy logic based obstacle avoidance to create safe movement. The system also provides easy integration with any communications protocol, plug-and-play devices, perceptions, and behaviors. Most behaviors and the obstacle avoidance parameters are easily changed through configuration files. Combined with previous work in the area of navigation and localization a very robust autonomy suite is created.

DTIC

Fuzzy Systems; Intelligence; Robotics; Robots; Sequencing

20080010010 Space and Naval Warfare Systems Center, Bremerton, WA USA

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report

Johnston, Robert K; Wang, P F; Jan 2006; 7 pp.; In English

Contract(s)/Grant(s): N00014-02-1-0502

Report No.(s): AD-A475643; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Estuaries, fjords and sounds are important, major components of marine ecosystems worldwide. Because of this, and their generally poor treatment by man, large estuaries should be the focus of large scale, multidisciplinary, integrative modeling efforts. We need to both understand how these systems work, and be able to predict how they will respond to changes, whether natural or anthropogenic. Puget Sound, Washington State's largest inland sea, is both the largest fjord in the lower forty-eight states and closest to the substantial urban centers. Relative to other coastal systems, Pacific Northwest fjords have seasonally high annual phytoplankton standing stock and primary production, and they support several economically valuable fisheries. Our long-term goals are to develop quantitative understanding of the seasonal and longer time-scale variability of the Sound's circulation, roles of water column stratification, nutrients, and light (and their interactions) on phytoplankton and zooplankton dynamics, and the sensitivity of the physical and the biological system to natural and human perturbations. We will develop models of Puget Sound that can aid agencies with responsibilities for environmental management in making informed decisions and serve as marine science education tools. A special emphasis for this component of the project is to develop an inlet-scale integrated modeling system that will include the hydrodynamic and contaminant transport within the receiving waters of Sinclair and Dyes Inlets, the surrounding watershed, and the boundaries with the Greater Puget Sound System. During the FY2006 reporting period, PSNS/SPAWAR partners have successfully completed a joint current meter study with Ecology partners for Agate, Port Orchard and Rich Passages, extracted data from the POM output for input as boundary conditions for the Sinclair/Dyes Inlet model, developed a set of analysis tools to process model output, and implemented the linkage between the models.

DTIC

Hydrodynamics; Marine Environments; Navy; Shipyards; Sounds (Topographic Features); Warfare

20080010012 Carnegie-Mellon Univ., Pittsburgh, PA USA

Capability Maturity Model (Trademark) Integration (CMMI (Service Mark)), Version 1.1. CMMI (Service Mark) for Software Engineering (CMMI-SW, V1.1)

Aug 19, 2002; 645 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F19628-00-C-0003

Report No.(s): AD-A475656; CMU/SEI-2002-TR-028; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Capability Maturity Model Integration (CMMI Service Mark) models have evolved the Capability Maturity Model Registered Service Mark (CMM Registered Service Mark) concept, established by the Capability Maturity Model for Software (SW-CMM), to a new level that enables the continued growth and expansion of the CMM concept to multiple disciplines. Like the SW-CMM, EIA/IS 731, IPD-CMM, SA-CMM, and other process improvement models, CMMI models are tools that help organizations improve their processes. This CMMI model is designed to help organizations improve their product and service development, acquisition, and maintenance processes. Software engineering concepts are covered by this model, including traditional CMM concepts such as process management and project management. Each CMMI model is designed to be used in concert with other CMMI models, making it easier for organizations to pursue enterprise-wide process improvement at their own pace. This CMMI model has a continuous representation, which focuses on measuring process improvement using capability levels. Capability levels apply to process-improvement achievement within individual process areas such as Configuration Management or Verification.

DTIC

Computer Programming; Computer Programs; Mathematical Models; Software Engineering

20080010138 NASA Langley Research Center, Hampton, VA, USA

Verification of Software: The Textbook and Real Problems

Carlson, Jan-Renee; [2006]; 18 pp.; In English; 11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, 6-8 Sep. 2006, Portsmouth, VA, USA; Original contains black and white illustrations

Report No.(s): AIAA Paper 2006-7128; No Copyright; Avail.: CASI: A03, Hardcopy

The process of verification, or determining the order of accuracy of computational codes, can be problematic when working with large, legacy computational methods that have been used extensively in industry or government. Verification does not ensure that the computer program is producing a physically correct solution, it ensures merely that the observed order of accuracy of solutions are the same as the theoretical order of accuracy. The Method of Manufactured Solutions (MMS) is one of several ways for determining the order of accuracy. MMS is used to verify a series of computer codes progressing in sophistication from 'textbook' to 'real life' applications. The degree of numerical precision in the computations considerably influenced the range of mesh density to achieve the theoretical order of accuracy even for 1-D problems. The choice of manufactured solutions and mesh form shifted the observed order in specific areas but not in general. Solution residual (iterative) convergence was not always achieved for 2-D Euler manufactured solutions. L_2 convergence differed variable to variable therefore an observed order of accuracy could not be determined conclusively in all cases, the cause of which is currently under investigation.

Author

Program Verification (Computers); Proving; Accuracy; Computer Programs; Selection; Convergence

20080010716 CAE Professional Services, Ottawa, Ontario Canada

Herc SAR Task 106: AIMS Feature Development

Schoenborn, Oliver; Krga, Paul; Mar 2007; 26 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475337; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475337>

This document is the final report for Herc - SAR Task 106 - AIMS Feature Development. Several features to the AIMS simulation system, AIMSsim (previously called ELVISS), have been added to support human factors experimentation. The report summarizes the work performed and makes recommendations for the next phase. Software was developed to add scenario generation capability to the existing AIMSsim experimental research platform at DRDC. Core tasks were completed in the expected amount of time and some unplanned capabilities, such as path planning for targets, were added to the system to support an experiment by DRDC Atlantic.

DTIC

Computerized Simulation; Human-Computer Interface; Infrared Radiation; Multisensor Applications; Software Development Tools; Surveillance

20080010718 CAE Professional Services, Ottawa, Ontario Canada

AIMSsim Version 2.2.1, User Manual

Schoenborn, Oliver; Mar 2007; 92 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475336; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475336>

This user manual provides an overview of how to use the software developed to support the empirical investigation of a simulated user interface for an Advanced Integrated Multi sensor Surveillance (AIMS) system (formerly known as the Enhanced Low Light Level Visible and Infrared Surveillance System ELVISS). The AIMS system is an electro-optical imaging system being developed by the Defence Research and Development Canada (DRDC)-Valcartier to enhance the capability of search and rescue (SAR) crews to operate effectively at night and in degraded weather conditions. In order to ensure that a SAR operator would be able to use the system effectively and with a minimal amount of training, a prototype human machine interface (HMI) was developed to evaluate design concepts. The latest development phase added important tracking and motion related functionality (amongst other things) to the system and gave it a new name AIMSsim.

DTIC

Computerized Simulation; Infrared Radiation; Manuals; Multisensor Applications; Software Development Tools; Surveillance; User Manuals (Computer Programs)

20080010719 MacDonald, Dettwiler and Associates Ltd., Richmond, British Columbia Canada

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software

Wilson, David; Oct 2007; 52 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475316; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475316>

Coherent Target Monitoring (CTM) is COTS software that was developed to detect the rate of land subsidence by using Synthetic Aperture Radar (SAR) repeat-pass interferometry applied to persistent scatterers in the scene. DRDC Ottawa has proposed to use the CTM software to produce a time-series of accurately co-registered SAR images and coherence maps that may be used for both non-coherent and coherent change detection. This capability within the CTM software was improved by DRDC Ottawa developing Sequential CTM, whereby the images in the time series are co-registered sequentially in a pair-wise manner. This report documents testing of the Sequential CTM software and includes the time series of RADARSAT-1 Fine mode images that have been processed, as well as processing procedures, some results, and problems that arose. Test sites include Resolute Bay, NV, Kandahar, Afghanistan, CFB Valcartier, and the Miramar, NU mine site.

DTIC

Computer Programs; Interferometry; RADARSAT; Synthetic Aperture Radar; Targets; Time Series Analysis

20080010722 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Sonar 3 VMSA Federate: User Guide and Technical Description

Gillis, Allan; Apr 2007; 68 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475365; DRDC ATLANTIC TM 2005-286; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475365>

This federate provides a medium fidelity sonar model for Virtual Maritime Systems Architecture (VMSA) high level architecture (HLA) simulations. The model best represents towed array systems, but can be configured to model flank arrays as well. The Sonar model is coupled with an auto-detector/signal follower that creates VMSA Sonar tracks without an operator. While the federate is written in Java, the signal follower is provided only as a compiled Windows DLL. This limits the federate to the Windows operating system, either Windows 2000 or XP. This document describes the federate software, how to use it, and how to integrate the federate into DRDC Atlantic's VMSA execution system. As well, the software design and technical details are explained. This document covers version 3.0.1 of the Sonar federate.

DTIC

Distributed Interactive Simulation; Manuals; Sonar

20080010737 Naval Postgraduate School, Monterey, CA USA

Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package

Olwell, David H; Johnson, Jean; Few, Stephanie; Didoszak, Jarema M; Dec 2007; 691 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DWAM-70217

Report No.(s): AD-A475311; NPS-SE-08-M01; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475311>

This technical report presents the deliverables for calendar year 2007 for the 'Educating the Modeling and Simulation Workforce' project performed for the DoD Modeling and Simulation Steering Committee. It includes the results for spirals one and two. Spiral one is an analysis of the educational needs of the program manager, systems engineer, and test and evaluation workforces against a set of educational skill requirements developed by the project team. This is referred to as the 'learning matrix'. Spiral two is a set of module and course matrices, along with delivery options, that meets the educational needs identified in spiral one. This is referred to as the learning architecture. Supporting materials, such as case studies and a handbook, are included. These documents serve as the design framework for spirals three and four, to be completed in CY2008, and which involve the actual production and testing of the courses in the learning architecture and their longitudinal assessment. This report includes the creative work of a seven university consortium and a group of M&S stake-holders, together comprising over 60 personnel.

DTIC

Computerized Simulation; Delivery; Education; Simulation

20080010739 Charles River Analytics, Inc., Cambridge, MA USA

A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models

Langton, John; Das, Subrata; Nov 2007; 122 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-06-C-0076; Proj-558S

Report No.(s): AD-A475419; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475419>

A framework for the development and integration of Political, Military, Economic, Social, Information, and Infrastructure (PMESII) models in support of a Commander's Predictive Environment (CPE) was investigated and developed. Key challenges were allowing analysts to share their models, interconnect their models, and explore the relationships between elements in a network of integrated models. Areas explored included how to translate between different interfaces, ontologies, sub-domains, and formalisms, e.g., Bayesian networks or causal diagrams for representing and executing or simulating models. Modeling paradigms investigated included, causal graphical models, stability and reconstruction operations models (SROM), concept graphs, concept maps, and various tools for building neural network models and production rules. Also included are results of investigations, recommendations for resolving model incompatibilities, methods for reasoning with heterogeneous networks of models, and a system design specification.

DTIC

Adaptation; Economics; Interoperability

20080010770 Charles River Analytics, Inc., Cambridge, MA USA

A Toolkit for Building Hybrid, Multi-Resolution PMESII Models

Bachman, John A; Harper, Karen A; Nov 2007; 66 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-06-C-0078; Proj-558S

Report No.(s): AD-A475418; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475418>

A software toolkit for constructing, integrating, debugging, validating and verifying, and maintaining heterogeneous Political, Military, Economic, Social Information, and Infrastructure (PMESII) models in support of a Commander's Predictive Environment (CPE) was developed. This development environment is based upon Charles River Analytic's Graphical Agent Development Environment (GRADE), and provides intuitive graphical tools supporting the development of new models and adaptation of existing PMESII models. The component-based software architecture enables the injection of new modeling paradigms, e.g., semantic networks, system dynamic models, etc., and existing legacy PMESII models; as well as GUI-based model tools to enable data-level integration. The toolkit provides (1) an intuitive graphical model development environment, (2) a suite of model integration tools, (3) a suite of model verification and validation tools, (4) a model analysis

infrastructure, (5) a suite of multi-resolution modeling tools and supporting infrastructure, and (6) a model management infrastructure.

DTIC

Architecture (Computers); Economics; Software Development Tools

20080010781 Cycorp, Inc., Austin, TX USA

Efficient Pathfinding in Very Large Data Spaces

Lenat, Douglas B; Goolsbey, Keith; Knight, Kevin; Smith, Pace; Nov 2007; 62 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-06-C-0003; Proj-RAPD

Report No.(s): AD-A475387; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475387>

This project created a corpus of large test problems relevant to the Intelligence Community (IC). These problems required bringing together only facts and rules from the unclassified OpenCyc knowledge base. Because many current theorem provers are unable to a reason with (or even load) an IC-sized knowledge base, six different levels of problems were created, each containing progressively larger theories. Dozens of Automatic Theorem Proving (ATP) researchers are now heavily engaged in attacking more and more of these six new TPTP problem sets. In addition to challenging the theorem-proving community, this project contained a series of experiments to assess and, where possible, improve the efficiency of Cyc's general inference engine. These experiments identified areas for immediate improvement, and approximately one full factor of 10 speedup was obtained just in the course of carrying them out and analyzing their results.

DTIC

Intelligence; Knowledge Based Systems

20080010789 Humansystems, Inc., Guelph, Ontario Canada

Review of Collaborative Tools for Planning and Engineering

Lamoureux, Tab; Rehak, Lisa; Oct 2007; 76 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475372; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475372>

The objectives of this work were (1) to survey the marketplace for available tools that may provide collaborative environments to support Synthetic Environment based exercises and experiments, and evaluate the most relevant candidates and (2) to develop an evaluation method for assessing collaborative planning and engineering tools. A literature review was conducted, followed by Subject Matter Experts (SMEs) interviews. A total of 215 collaborative tools were uncovered. In order to develop an evaluation method for these tools, it was realized that users of collaborative planning and engineering tools would have specific uses for the tools or goals for the tools known prior to tool selection. Further, specific requirements would be desired of the tools. This led to the creation of the Evaluation Matrix which was used to evaluate select collaborative tools. Research and development opportunities can also be identified through the evaluation matrix. Finally, a number of changes are proposed for the evaluation matrix. The authors feel that this project has provided an important first step toward the technological support of distributed planning and engineering teams.

DTIC

Computer Programs; Computerized Simulation; Engineering; Planning

20080010790 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Gun Control for VBE-E: User Guide and Technical Description

Wentzell, Tania E; Nov 2006; 46 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475369; DRDC ATLANTIC TM 2006-245; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475369>

This paper describes the gun control interface that was added to the Horizon 3 Command and Control (C2) framework, a central component of the distributed experimentation environment used by the Virtual Combat System (VCS) Group at Defence R&D Canada Atlantic (DRDC Atlantic), for Virtual Battle Experiment Echo (VBE-E). This interface, in the form of a Horizon plug-in, allows the operator to identify which targets are within firing range, assign targets to the gun, fire the gun, and monitor ammunition inventory. The plug-in was developed with a 76mm gun in mind, to support the requirements of the Technical Cooperation Program's (TTCP) Maritime Systems Group Technical Panel 1's (MAR TP-1) VBE-E, which took

place in October 2006. The paper is divided into three main sections. The first section describes what an operator using the plug-in needs to know about the interface. The second section is for the scenario developer who wishes to configure an instance of Horizon and an existing Virtual Maritime Systems Architecture (VMSA) federation to include one or more gun controllers. The third section deals with the High Level Architecture (HLA) details of the interface and how it interacts with a gun federate that models the gun itself and the resulting detonations. While any gun model could conceivably be modified to be a VMSA gun federate and communicate with the gun controller, a gun federate was also developed for VBE-E, and it is this federate that will be referred to in this final section.

DTIC

Computerized Simulation; Manuals; Plugs

20080010793 Columbia Univ., New York, NY USA

Augmented Reality for Maintenance and Repair (ARMAR)

Henderson, Steven J; Feiner, Steven K; Aug 2007; 70 pp.; In English

Contract(s)/Grant(s): FA8650-05-2-6647; Proj-1710

Report No.(s): AD-A475548; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The purpose of this research, Augmented Reality for Maintenance and Repair (ARMAR), was to research the design and development of experimental augmented reality systems for maintenance job aiding. The goal was to explore and evaluate the feasibility of developing prototype adaptive augmented reality systems that can be used to investigate how real time computer graphics, overlaid on and registered with the actual equipment being maintained, can significantly increase the productivity of maintenance personnel, both during training and in the field.

DTIC

Computer Aided Design; Maintenance

20080010874 NASA Johnson Space Center, Houston, TX, USA

JBoss Middleware for Spacecraft Trajectory Operations

Stensrud, Kjell; Srinivasan, Ravi; Hamm, Dustin; February 13, 2008; 31 pp.; In English; JBoss World 2008, 13-15 Feb. 2008, Orlando, FL, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

This viewgraph presentation reviews the use of middleware for spacecraft trajectory planning. It reviews the following areas and questions: 1. Project Background - What is the environment where we are considering Open Source Middleware? 2. System Architecture - What technologies and design did we apply? 3. Testing overview - What are the quality scenarios and test points? 4. Project Conclusion - What did we learn about Open Source Middleware?

CASI

Applications Programs (Computers); Spacecraft Trajectories; Trajectory Planning; Systems Engineering; Trajectory Analysis; Software Reliability

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.

20080009638 Boeing Co., Chicago, IL USA

Network device interface for digitally interfacing data channels to a controller via a network

Ellerbrock, Philip J., Inventor; Grant, Robert L., Inventor; Konz, Daniel W., Inventor; Winkelmann, Joseph P., Inventor; October 2, 2007; 32 pp.; In English

Contract(s)/Grant(s): NCCW-0076

Patent Info.: Filed December 3, 2003; US-Patent-7,277,970; US-Patent-Appl-SN-10/726,918; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009638>

The present invention provides a network device interface and method for digitally connecting a plurality of data channels, such as sensors, actuators, and subsystems, to a controller using a network bus. The network device interface interprets commands and data received from the controller and polls the data channels in accordance with these commands. Specifically, the network device interface receives digital commands and data from the controller, and based on these commands and data, communicates with the data channels to either retrieve data in the case of a sensor or send data to activate

an actuator. Data retrieved from the sensor is converted into digital signals and transmitted to the controller. In some embodiments, network device interfaces associated with different data channels coordinate communications with the other interfaces based on either a transition in a command message sent by the bus controller or a synchronous clock signal.

Official Gazette of the U.S. Patent and Trademark Office

Computer Networks; Channels (Data Transmission); Data Links; Sensors; Actuators; Controllers

20080009738 NASA Johnson Space Center, Houston, TX, USA; L-3 Communications, Inc., Houston, TX, USA

NASA Constellation Distributed Simulation Middleware Trade Study

Hasan, David; Bowman, James D.; Fisher, Nancy; Cutts, Dannie; Cures, Edwin Z.; [April 14, 2008]; 8 pp.; In English; 2008 Spring Simulation Interoperability Workshop (SIW), 14-18 Apr. 2008, Providence, RI, USA; Copyright; Avail.: CASI:

[A02](#), Hardcopy

This paper presents the results of a trade study designed to assess three distributed simulation middleware technologies for support of the NASA Constellation Distributed Space Exploration Simulation (DSES) project and Test and Verification Distributed System Integration Laboratory (DSIL). The technologies are the High Level Architecture (HLA), the Test and Training Enabling Architecture (TENA), and an XML-based variant of Distributed Interactive Simulation (DIS-XML) coupled with the Extensible Messaging and Presence Protocol (XMPP). According to the criteria and weights determined in this study, HLA scores better than the other two for DSES as well as the DSIL.

Author

Distributed Interactive Simulation; Simulation; Architecture (Computers); Applications Programs (Computers); Constellation Program

20080009968 Naval Postgraduate School, Monterey, CA USA

TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report

Guest, Peter; Davidson, Kenneth; Jordan, Mary; Lind, Richard; Oct 12, 2007; 49 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475535; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The authors participated in four Tactical Network Topology Marine Interdiction Operations (TNT MIOs) during FY 2007. The overall goals of the authors TNT MIO studies were (1) to provide military and law enforcement personnel with real time and future information on how the environment will affect marine interdiction operations and (2) to develop, verify and improve models and procedures used in (1) by comparing predictions with actual in situ observations. Similar to earlier TNT MIO experiments, the authors addressed how environmental factors affect the transmission of radiation in the visible and radio bands of the electromagnetic spectrum. But, unlike the earlier experiments, more emphasis was placed on other environmental effects such as winds, sea state, tides and other weather factors. By developing a system to provide the relevant personnel with this information we hope to (1) enhance overall situational awareness, (2) enhance mission planning and safety and (3) provide an advantage over any potential adversaries who might not consider these atmospheric effects. For this project we made in situ measurements of atmospheric conditions as and also incorporated a large amount of outside information to give a better picture of the environmental conditions that affected the MIO. In addition to providing weather briefings in the mornings of the operations, several environmental products were made available via the experimental networks. These products included results of visibility and radar range model predictions developed especially for these experiments as well as more general products downloaded from the World Wide Web. The data collection efforts were successful and allowed verification and improvement of the effects models.

DTIC

Atmospheric Effects; Atmospherics; Law (Jurisprudence); San Francisco Bay (CA); Topology

20080010084 NASA Ames Research Center, Moffett Field, CA, USA

Data Mining SIAM Presentation

Srivastava, Ashok; McIntosh, Dawn; Castle, Pat; Pontikakis, Manos; Diev, Vesselin; Zane-Ulman, Brett; Turkov, Eugene; Akella, Ram; Xu, Zuobing; Kumaresan, Sakthi Preethi; January 2006; 30 pp.; In English; 2006 SIAM Conference on Data Mining, 20-22 Apr. 2006, Bethesda, MD, USA; Original contains black and white illustrations; Copyright; Avail.: CASI:

[A03](#), Hardcopy

This viewgraph document describes the data mining system developed at NASA Ames. Many NASA programs have large numbers (and types) of problem reports. These free text reports are written by a number of different people, thus the emphasis and wording vary considerably. With so much data to sift through, analysts (subject experts) need help identifying any possible

safety issues or concerns and help them confirm that they haven't missed important problems. Unsupervised clustering is the initial step to accomplish this; We think we can go much farther, specifically, identify possible recurring anomalies. Recurring anomalies may be indicators of larger systemic problems. The requirement to identify these anomalies has led to the development of Recurring Anomaly Discovery System (ReADS).

CASI

Data Mining; Cluster Analysis; Natural Language Processing; Information Analysis

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*.

20080009864 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada
Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420

Ellis, Dale D; Mar 2007; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-06-1-0830; N00014-03-1-0420

Report No.(s): AD-A475366; DRDC ATLANTIC ECR 2006-212; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475366>

The long-term goal of this work is to better understand and model reverberation and clutter in shallow water environments, and to develop techniques for Rapid Environmental Assessment (REA) and environmentally adaptive sonar. The current project is a continuation of a joint collaboration (N000140310420) between Defence Research & Development Canada Atlantic (DRDC Atlantic) and the Applied Research Laboratory of Penn State University (ARL/PSU) to analyze and model reverberation, target echo, and clutter data in shallow water. It allows the PI to spend approximately three months each year at ARL/PSU. The collaboration leverages programs in Canada, US, and a joint research project with the NATO Undersea Research Centre (NURC) on Wideband Clutter Characterization. The primary effort is analysis and interpretation of data, together with development and validation of improved modeling algorithms. One focus is the performance of directional sensors in towed arrays. A fast shallow water sonar model that includes target echo and clutter is being developed and validated. Experiments will be proposed for the 2007 clutter experiment with NURC, and the data analyzed.

DTIC

Reverberation; Shallow Water; Sonar; Targets

20080009884 Concordia Univ., Montreal, Quebec Canada
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques

Gordon, Brandon W; Izadi, Hojjat A; Azimi, Ali; Pakmehr, Mehrdad; Zhao, Yan; Mar 2007; 408 pp.; In English

Contract(s)/Grant(s): W7701-051911

Report No.(s): AD-A475429; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475429>

This report documents the work related to tasks #1, 2, 3 and 5 for the project entitled 'Synthesis and Implementation of Single- and Multi-vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques'. In this report the radial basis function (RBF) neural network control approach for active flow control extended to handle unmodelled dynamics and multiple equilibria in hybrid (switching) system framework. Hybrid RBF adaptive controller applied to delta wing vortex-coupled-lead roll dynamics using hysteresis switching logic. The combinatory control method also applied to the delta wing dynamics coupled with the SMA micro actuator dynamics which has been obtained from identification process in DRDC. In this report also the linear parameter-varying sliding mode control (LPVSMC) approach which has been developed for linear parameter-varying time-delayed systems (LPVTDS) has been applied to delta wing model coupled with SMA dynamics. This approach combines sliding mode control (SMC), linear parameter-varying (LPV) control theory, and time delay stability analysis to solve a LPVTDS control problem. It is anticipated that this method will lead to significant improvement over existing SMC approaches in aerospace applications with parameter variations and coupled with new SMA actuating devices.

DTIC

Control Systems Design; Guidance (Motion); Hysteresis; Nonlinearity; Optimization; Switching

20080009885 Oregon State Univ., Corvallis, OR USA

Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models

Samelson, Roger M; Allen, John S; Egbert, Gary D; Kindle, John C; Snyder, Chris; Jan 2006; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-1-0891

Report No.(s): AD-A475432; XB-NRL/CR/7330; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475432>

The specific objectives of this research are to determine the impact on coastal ocean circulation models of open ocean boundary conditions from Global Ocean Data Assimilation Experiment (GODAE) Pacific Ocean models, and to address closely related issues of uncertainty and predictability in coastal ocean models.

DTIC

Assimilation; Boundary Conditions; Coasts; Ocean Models; Predictions

20080009938 Naval Research Lab., Bay Saint Louis, MS USA

U.S. GODALE: Global Ocean Prediction With the HYbrid Coordinate Ocean Model

Hurlburt, Harley E; Jan 2006; 13 pp.; In English

Contract(s)/Grant(s): N0001406WR20251

Report No.(s): AD-A475449; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long term goal of this project is to use HYbrid Coordinate Ocean Model (HYCOM) with data assimilation in an eddy-resolving, fully global ocean prediction system with transition to the Naval Oceanographic Office (NAVOCEANO) at .08 equatorial (~7 km mid-latitude) resolution in 2007 and .04 resolution in 2011. The model will include shallow water and provide boundary conditions to finer resolution coastal and regional models that may use HYCOM or a different model. In addition, HYCOM will be coupled to atmospheric, ice and bio-chemical models, with transition to the Fleet Numerical Meteorology and Oceanography Center (FNMOC) for the coupled ocean-atmosphere prediction. One objective is to participate in the multinational Global Ocean Data Assimilation Experiment (GODAE) and international GODAE-related ocean prediction system intercomparison projects.

DTIC

Computerized Simulation; Ocean Models; Oceans

20080009941 Massachusetts Inst. of Tech., Cambridge, MA USA

Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots

Pratt, Jerry E; Jun 2000; 159 pp.; In English

Contract(s)/Grant(s): N39998-00-C-0656

Report No.(s): AD-A475455; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Walking is an easy task for most humans and animals. Two characteristics which make it easy are the inherent robustness (tolerance to variation) of the walking problem and the natural dynamics of the walking mechanism. In this thesis we show how understanding and exploiting these two characteristics can aid in the control of bipedal robots. Inherent robustness allows for the use of simple, low impedance controllers. Natural dynamics reduces the requirements of the controller. We present a series of simple physical models of bipedal walking. The insight gained from these models is used in the development of three planar (motion only in the sagittal plane) control algorithms. The first uses simple strategies to control the robot to walk. The second exploits the natural dynamics of a kneecap, compliant ankle, and passive swing-leg. The third achieves fast swing of the swing-leg in order to enable the robot to walk quickly (1:25m s). These algorithms are implemented on Spring Flamingo, a planar bipedal walking robot, which was designed and built for this thesis. Using these algorithms, the robot can stand and balance, start and stop walking, walk at a range of speeds, and traverse slopes and rolling terrain. Three-dimensional walking on flat ground is implemented and tested in simulation. The dynamics of the sagittal plane are sufficiently decoupled from the dynamics of the frontal and transverse planes such that control of each can be treated separately. We achieve three-dimensional walking by adding lateral balance to the planar algorithms. Tests of this approach on a real three-dimensional robot will lead to a more complete understanding of the control of bipedal walking in robots and humans.

DTIC

Adaptive Control; Robots; Robustness (Mathematics); Walking

20080009955 Geological Survey, Woods Hole, MA USA

Coastal Sediment Transport Models and Mixed Particle Size Dynamics

Sherwood, Christopher R; Rubin, David M; Jan 2006; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N0001406IP20039

Report No.(s): AD-A475494; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The long-term goal of our research program is to advance scientific understanding and predictive modeling of sediment-transport processes in coastal and estuarine environments. The processes are important to the Navy because they define the tactical environment in shallow water and directly affect optical and acoustic properties of the water column. The resulting seabed structure and morphology affect acoustic backscatter and ability to locate objects on or near the bottom. Predictive capabilities for coastal sedimentary processes are also of great interest to geologists, coastal resource managers, and environmental scientists interested in mitigating coastal hazards, protecting or restoring coastal resources, or remediating contaminated marine environments. We have been funded to participate in two ongoing ONR projects: EuroSTRATAFORM and OASIS, and we plan to collaborate on the Ripples DRI. Our long-term research goals are closely aligned with the objectives of these programs.

DTIC

Coasts; Ocean Models; Sediment Transport

20080009975 Space and Naval Warfare Systems Center, San Diego, CA USA

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles

Kogut, G; Ahuja, G; Sights, B; Pacis, E B; Everett, H R; Jan 2007; 12 pp.; In English

Report No.(s): AD-A475549; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Sensors commonly mounted on small unmanned ground vehicles (UGVs) include visible light and thermal cameras, scanning LIDAR, and ranging sonar. Sensor data from these sensors is vital to emerging autonomous robotic behaviors. However, sensor data from any given sensor can become noisy or erroneous under a range of conditions, reducing the reliability of autonomous operations. We seek to increase this reliability through data fusion. Data fusion includes characterizing the strengths and weaknesses of each sensor modality and combining their data in a way such that the result of the data fusion provides more accurate data than any single sensor. We describe data fusion efforts applied to two autonomous behaviors: leader-follower and human presence detection. The behaviors are implemented and tested in a variety of realistic conditions.

DTIC

Intelligence; Multisensor Fusion; Pattern Recognition; Reliability; Robotics; Unmanned Ground Vehicles

20080009976 Space and Naval Warfare Systems Center, San Diego, CA USA

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations

Pezeshkian, Narek; Nguyen, Hoa G; Burmeister, Aaron; Jan 2007; 7 pp.; In English

Report No.(s): AD-A475552; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Tactical mobile robots used in military and law enforcement operations normally require a robust, long range, and non-line-of-sight (NLOS) communications link to the remote control station. This is especially true for Explosive Ordnance Disposal (EOD) operators using robots to defeat Improvised Explosive Devices (IEDs). High frequency digital radio communications, currently the preferred technology, are subject to line-of-sight (LOS) limitations, and thus are often impossible to maintain in urban environments. We have developed a system that will allow the mobile robot to carry multiple relay radios that are automatically deployed when and where needed in order to maintain robust communications. This process is completely transparent to the operator and is entirely handled by the ad-hoc network formed by the relay radios. The system is plug-and-playable, and can be attached to many manned and unmanned vehicles requiring long-range and non-LOS operational capability. Experimental data compares the effective range achieved with and without the use of our relay deployment system.

DTIC

Deployment; Line of Sight; Military Operations; Radio Relay Systems; Robots; Unmanned Ground Vehicles

20080010007 Bar-Ilan Univ., Ramat-Gan, Israel

Information Theoretic Radar Waveform Design for Multiple Targets

Leshem, Amir; Naparstek, Oshri; Nehorai, Arye; Jan 2007; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0443; FS9550-05-1-0018

Report No.(s): AD-A475632; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this paper we describe the optimization of an information theoretic criterion for radar waveform design. The method

is used to design radar waveforms suitable for simultaneously estimating and tracking parameters of multiple targets. Our approach generalizes the information theoretic water-filling approach of Bell. The paper has two main contributions. First, a new information theoretic design criterion for designing multiple waveforms under a joint power constraint when beamforming is used both at transmitter and receiver. Then we provide a highly efficient algorithm for optimizing the transmitted waveforms, by approximating the information theoretic cost function. We show that using Lagrange relaxation the optimization problem can be decoupled into a parallel set of low-dimensional search problems at each frequency, with dimension defined by the number of targets instead of the number of frequency bands used.

DTIC

Beamforming; Information Theory; Targets; Waveforms

20080010710 Rensselaer Polytechnic Inst., Troy, NY USA

Micro-PSYPRE (Psi m sub x): Toward Computing the Future

Bringsjord, Selmer; Clark, Micah; Houston, Trevor; Arkoudas, Konstantine; Oct 5, 2007; 29 pp.; In English

Report No.(s): AD-A475621; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The acute desire, on the part of the USA, to engage in Effects-Based Operations (or, for short, EBO; see e.g. Deptula 2001, Davis 2001) is here to stay. The name may of course change (and that's why we refer generically to computing the future), but the desire to determine what the future will bring, not just with respect to the physical effects of physical attack, but also with respect to the psychological effects of physical and psychological attack, will persist for a very long time. Even our enemies understand that the exclusive use of classical, purely kinetic, force-on-force conflict is obsolete: It is certainly not the mode in which to take on the USA. Our enemies see their only chance in unrestricted warfare (Liang & Xiangsui 1999). If for no other reason than that we must fight fire with fire, and answer the various dimensions of asymmetrical conflict, we must rely on EBO, which by definition seeks to exploit the effects of blue force actions on individual and collective psyches of red and grey forces. Unfortunately, we must all confess on the other hand that, at least at present, EBO is just a pipe dream. What's the source of the problem? That's easy: vagueness. The kinetic effects of, say, a cruise missile can be calculated on the strength of clarity achieved by physics and engineering. But when trying to calculate the effects of such a missile on morale, clarity is hard to come by. EBO will never mature beyond fantasy unless we can formalize and mechanize the murky terms and concepts currently used to describe the cognitive side of it. In short, unless we have a formal account, with a corresponding implementation, of what it means to be a person, we will never be able to engage with any precision and reliability in EBO. The solution to the problem is to engineer a system able to PREDict the effects, including the PSYchological effects, of actions and sequences of actions we call this system PSYPRE or, for short, simply Psi.

DTIC

Physiological Effects; War Games

20080010712 Space and Naval Warfare Systems Command, San Diego, CA USA

Layered Augmented Virtuality

Ahuja, G; Pacis, E B; Sights, B; Fellars, D; Everett, H R; Jan 2007; 7 pp.; In English

Report No.(s): AD-A475582; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Advancements to robotic platform functionalities and autonomy make it necessary to enhance the current capabilities of the operator control unit (OCU) for the operator to better understand the information provided from the robot. Augmented virtuality is one technique that can be used to improve the user interface, augmenting a virtual-world representation with information from onboard sensors and human input. Standard techniques for displaying information, such as embedding information icons from sensor payloads and external systems (e.g. other robots), could result in serious information overload, making it difficult to sort out the relevant aspects of the tactical picture. This paper illustrates a unique, layered approach to augmented virtuality that specifically addresses this need for optimal situational awareness. We describe our efforts to implement three display layers that sort the information based on component, platform, and mission needs.

DTIC

Robotics; Augmentation; Autonomy

20080010730 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Correlation Based Testing for Passive Sonar Picture Rationalization

Mellema, Garfield R; Jul 10, 2007; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475291; DRDC-ATLANTIC-SL-2007-146; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475291>

Modern passive sonar systems employ a high degree of automation to produce a track-level sonar picture. Further

refinement of the track-level information is normally performed by a human operator. Providing automated assistance would reduce the operator's workload and is a key enabler for semi and fully automated sonar systems. The nature of the signals emitted by targets and of the underwater environment typically results in each target being represented by multiple track segments. A tool is required which can numerically describe the relationship between pairs of track segments so that those that apparently share a common origin can be identified automatically. The sample correlation coefficient, is a statistical measure of relatedness. This paper describes the application of a test based on that measure to compare tracks produced by a probabilistic data association filter from a set of towed array sonar data. Keywords

DTIC

Images; Multisensor Fusion; Signal Processing; Sonar

20080010741 Space and Naval Warfare Systems Center, San Diego, CA USA

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles

Larson, Jacoby; Bruch, Michael; Halterman, Ryan; Rogers, John; Webster, Robert; Jan 2007; 16 pp.; In English
Report No.(s): AD-A475547; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Space and Naval Warfare Systems Center, San Diego has been involved in the continuing development of obstacle avoidance for unmanned surface vehicles (USVs) towards the aim of a high level of autonomous navigation. An autonomous USV can fulfill a variety of missions and applications that are of increasing interest for the US Navy and other Department of Defense and Department of Homeland Security organizations. The USV obstacle avoidance package is being developed first by accurately creating a world model based on various sensors such as vision, radar, and nautical charts. Then, with this world model the USV can avoid obstacles with the use of a far-field deliberative obstacle avoidance component and a near-field reactive obstacle avoidance component. This paper addresses the advances made in USV obstacle avoidance during the last two years.

DTIC

Autonomous Navigation; Autonomy; Obstacle Avoidance; Radar; Robotics; Surface Vehicles

64

NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20080009984 Massachusetts Inst. of Tech., Cambridge, MA USA

Three-Dimensional Propagation and Scattering Around a Conical Seamount

Luo, Wenyu; Jun 2007; 264 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-05-1-0255

Report No.(s): AD-A475566; MIT/WHOI-2007-15; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this thesis, a numerically efficient three-dimensional propagation and scattering model is developed based on the three-dimensional coupled mode theory for axisymmetric bathymetry. The three-dimensional coupled mode approach applied in this thesis is fundamentally identical to the one applied in earlier models, such as the one presented by Taroudakis. Thus, it is based on a Fourier expansion of the acoustic field around a seamount, with each azimuthal expansion coefficient being represented by a two-way coupled mode formulation. However, earlier formulations were severely limited in terms of frequency, size and geometry of the seamount, the seabed composition, and the distance between the source and the seamount, and are totally inadequate for modeling high-frequency, large-scale seamount problems. By introducing a number of changes in the numerical formulation and using a standard normal mode model (C-SNAP) for determining the fundamental modal solutions and coupling coefficients, orders of magnitude improvement in efficiency and fidelity has been achieved, allowing for realistic propagation and scattering scenarios to be modeled, including effects of seamount roughness and realistic sedimentary structure. Also, by the simple superposition principle, the computational requirements are made independent of the distance between the seamount and the source and receivers, and dependent only on the geometry of the seamount and the frequency of the source.

DTIC

Conical Bodies; Coupled Modes; Models; Scattering; Seamounts; Spectra

20080010003 Maryland Univ., College Park, MD USA

The Role of Frame Force in Quantum Detection

Benedetto, John J; Kebo, Andrew; Jan 2007; 33 pp.; In English

Contract(s)/Grant(s): N00014-02-1-0398

Report No.(s): AD-A475623; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A general method is given to solve tight frame optimization problems, borrowing notions from classical mechanics. In this paper, we focus on a quantum detection problem, where the goal is to construct a tight frame that minimizes an error term, which in quantum physics has the interpretation of the probability of a detection error. The method converts the frame problem into a set of ordinary differential equations using concepts from classical mechanics and orthogonal group techniques. The minimum energy solutions of the differential equations are proven to correspond to the tight frames that minimize the error term. Because of this perspective, several numerical methods become available to compute the tight frames. Beyond the applications of quantum detection in quantum mechanics, solutions to this frame optimization problem can be viewed as a generalization of classical matched filtering solutions. As such, the methods we develop are a generalization of fundamental detection techniques in radar.

DTIC

Detection; Quantum Theory

20080010715 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer

Birsan, Marius; Sep 2006; 44 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475335; DRDC-A-TM-2006-188; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475335>

This report describes a numerical method that may be used to efficiently locate and track magnetic targets with a tensor gradiometer. A target containing ferromagnetic material can be adequately modeled at a distance by an equivalent magnetic dipole. This magnetic target can be observed by means of a magnetic gradiometer that measures a symmetric, traceless gradient tensor as a function of time. Of interest is the inverse problem of the determination of the magnetic parameters of the target, and its position and velocity relative to the sensor at each time step. The previous method of direct inversion of the non-linear equations of the magnetic gradient tensor provided multiple solutions, and the results can be highly sensitive to noise in data. In this study, the determination of target magnetic moment, position and velocity is formulated as an optimal stochastic estimation problem, which could be solved using a sequential Monte Carlo based approach known as the particle filter. In addition to the conventional particle filter, the proposed tracking and classification algorithm uses the unscented Kalman filter (UKF) to generate the prior distribution of the unknown parameters. The proposed method is then demonstrated by using it to locate and track an automobile over a period of time using real data collected with a magnetic gradiometer. Two cases are investigated: (1) the observation contains only gradiometer data when a double solution exists, and (2) magnetic field components are added to the previous case and a unique solution is obtained. The automobile was moving either on a straight or a curved track.

DTIC

Bayes Theorem; Magnetic Properties; Recursive Functions; Targets

20080010729 NASA Johnson Space Center, Houston, TX, USA

Evaluating the Gradient of the Thin Wire Kernel

Wilton, Donald R.; Champagne, Nathan J.; [2008]; 4 pp.; In English; 2008 IEEE International Symposium on Antennas and Propagation 2008 USNC/URSI (U.S. National Committee of the International Union of Radio Science) National Radio Science meeting, 5-12 Jul. 2008, San Diego, CA, USA; Original contains black and white illustrations; Copyright; Avail.: CASI:

A01, Hardcopy

Recently, a formulation for evaluating the thin wire kernel was developed that employed a change of variable to smooth the kernel integrand, canceling the singularity in the integrand. Hence, the typical expansion of the wire kernel in a series for use in the potential integrals is avoided. The new expression for the kernel is exact and may be used directly to determine the gradient of the wire kernel, which consists of components that are parallel and radial to the wire axis.

Author

Kernel Functions; Wire; Singularity (Mathematics); Formulations; Elliptic Functions

STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20080010009 Arizona State Univ., Tempe, AZ USA

Sequential MCMC Estimation of Nonlinear Instantaneous Frequency

Li, Y; Simon, D; Papandreou-Suppappola, A; Morrell, D; Murray, R L; Apr 2007; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0443

Report No.(s): AD-A475635; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Instantaneous frequency (IF) estimation of signals with nonlinear phase is challenging, especially for online processing. In this paper, we propose IF estimation using sequential Bayesian techniques, by combining the particle filtering method with the Markov chain Monte Carlo (MCMC) method. Using this approach, a nonlinear IF of unknown closed form is approximated as a linear combination of the IFs of non-overlapping waveforms with polynomial phase. Simultaneously applying parameter estimation and model selection, the new technique is extended to the IF estimation of multicomponent signals. Using simulations, the performance of this sequential MCMC approach is demonstrated and compared with an existing IF estimation technique using the Wigner distribution.

DTIC

Estimates; Frequencies; Markov Chains; Markov Processes; Monte Carlo Method; Nonlinearity; Sequential Analysis

20080010720 L-3 Communications, Inc., San Antonio, TX USA

Mathematical Approach to the Evaluation and Planning of Influence Operations

Albanese, Richard A; Duffie, Jennifer; Oct 2007; 24 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F41624-03-D-6002-0004; Proj-7184

Report No.(s): AD-A475360; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475360>

According to U.S. Air Force Concept of Operations for Information Operations, Influence Operations 'employ capabilities to affect behaviors, protect operations, communicate commander's intent, and project accurate information to achieve desired effects across the targeting domain. These effects should result in differing behavior or a change in the adversary decision cycle, which aligns with the commander's objectives.' Specific events involved in Influence Operations are Psychological Operations (PSYOP), military deception, counterintelligence, and public affairs functions aimed at foreign populations. This report describes research that aims to create a capability to quantitatively predict the results of influence operations. This research intends to meld mathematical methods from operations research, market research, psychology, sociology and economics to produce useful tools for the quantitative assessment of influence operations. The work is substantially interdisciplinary since it entails a cooperative endeavor of mathematically oriented scientists with specialists from market research, psychology, sociology, and economics. While the focus is on building useful mathematical structures, the intention is to apply these structures to actual combat data (after action reports) in the setting of influence operations.

DTIC

Mathematical Models; Operations Research

SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20080009754 NASA Langley Research Center, Hampton, VA, USA

Collaborative Mission Design at NASA Langley Research Center

Gough, Kerry M.; Allen, B. Danette; Amundsen, Ruth M.; November 08, 2005; 19 pp.; In English; 1st Annual Space Systems Engineering Conference, 8-10 Nov. 2005, Atlanta, GA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 23-612-40-85-10

Report No.(s): GT-SSEC.A.3; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009754>

NASA Langley Research Center (LaRC) has developed and tested two facilities dedicated to increasing efficiency in key mission design processes, including payload design, mission planning, and implementation plan development, among others.

The Integrated Design Center (IDC) is a state-of-the-art concurrent design facility which allows scientists and spaceflight engineers to produce project designs and mission plans in a real-time collaborative environment, using industry-standard physics-based development tools and the latest communication technology. The Mission Simulation Lab (MiSL), a virtual reality (VR) facility focused on payload and project design, permits engineers to quickly translate their design and modeling output into enhanced three-dimensional models and then examine them in a realistic full-scale virtual environment. The authors were responsible for envisioning both facilities and turning those visions into fully operational mission design resources at LaRC with multiple advanced capabilities and applications. In addition, the authors have created a synergistic interface between these two facilities. This combined functionality is the Interactive Design and Simulation Center (IDSC), a meta-facility which offers project teams a powerful array of highly advanced tools, permitting them to rapidly produce project designs while maintaining the integrity of the input from every discipline expert on the project. The concept-to-flight mission support provided by IDSC has shown improved inter- and intra-team communication and a reduction in the resources required for proposal development, requirements definition, and design effort.

Author

Mission Planning; NASA Programs; Payloads; Systems Engineering; Systems Analysis

20080009874 Pacific Science and Engineering Group, Inc., San Diego, CA USA

Naive Realism in Terrain Appreciation

Smallman, Harvey S; Cook, Maia B; Manes, Daniel I; Cowen, Michael B; Jan 2007; 6 pp.; In English

Report No.(s): AD-A475392; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475392>

Previously, we have shown that shaded perspective view (3-D) displays are better for understanding the shape and rough layout of terrain than conventional 2-D views. We have coined the term Naive Realism for users' misplaced, blanket faith in these 3-D displays (Smallman & St. John, 2005). There are hints in the individual difference literature that those of low spatial ability may be particularly prone to Naive Realism. Here, we integrate these notions to test several theoretical predictions and to develop a new terrain simplification concept. Thirty-three participants had their spatial ability and problem-solving style measured. Then participants predicted which displays would, and then did, best support them in performing a task of threading a concealed route through realistic terrain. Depth relief (shading vs. topographic lines), viewing angle (90 vs. 45) and terrain fidelity (high/unfiltered sharp vs. low/spatially smoothed) were all varied. Of the eight display combinations, Naive Realism correctly predicted the greatest preference for the highest fidelity, realistic 3-D view (sharp, shaded, 45). Yet the routing task was best performed with lower fidelity views. Spatially filtering terrain unmasks canyons and other gross terrain features, enabling them to pop-out more easily. Individuals of high spatial ability had better task performance and better calibrated their post-task display preferences, suggesting they are generally more savvy about the ways that display format affects their performance.

DTIC

Space Perception; Spatial Filtering; Terrain

20080010724 Defence Research and Development Canada, Ottawa, Ontario Canada

Control Theory Perspective of Effects-Based Thinking and Operations: Modelling 'Operations' as a Feedback Control System

Farrell, Philip S; Nov 2007; 66 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475344; DRDC-O-TR-2007-168; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475344>

This paper explores operations that involve effects-based thinking (EBT) using Control Theory techniques in order to highlight the concept's fundamental characteristics in a simple and straightforward manner. It provides some background to EBT, and presents three formal definitions for effects-based approaches to operations (EBAO). This paper shows that Control Theory is a useful framework for studying effects-based concepts. A specific EBAO concept was modelled using Control Theory techniques. This analysis has exposed key functions for operations and key tenets for effects-based thinking as listed below: Key Functions for Operations from a Control Theory Perspective: Planning, Assessment, Execution, Decision-making, and Analysis. Organization and Technology structures must be designed to support these functions. Key Tenets of Effects-Based Thinking from a Control Theory Perspective: * Effects are higher-level states (or changes in state) of the world. * Effects span the entire range of human endeavours (political, social, etc.). * Desired effects can be decomposed as a means-end hierarchy. * Effects are planned for and assessed explicitly. * Relationships between actions and effects are often complex. * Control Theory provides both proactive and reactive feedback mechanisms that drive current effects towards their desired values. Control Theory was used to model EBT concepts and operations, and provide a theoretical basis so that

effective system designs can be developed. It is hoped that this new way of looking at EBT operations will provide a framework for continued discussion and investigation of the ideas through mathematical analysis, constructive simulation, and human-in-the-loop experimentation.

DTIC

Control; Control Theory; Feedback; Feedback Control

20080010726 Defence Research and Development Canada, Ottawa, Ontario Canada

Two Crowd Control Case Studies

Desai, Soni; Taylor, Ivan; Aug 2007; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475297; DRDC-CORA-TN-2007-10; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475297>

The Operational Research (OR) Team in Defence Research Development Canada (DRDC) Valcartier has begun work on a research project on modeling and simulating of crowd behaviour. This technical note reports on two crowd behaviour case studies. The intent of this report is twofold: the data collected on these two case studies will be utilized by the researchers to validate a crowd behavior/control model; and the lessons learned from gathering and extracting data can be utilized by researchers at a later date when other crowd behaviour case studies are completed.

DTIC

Crowding

20080010746 NTT Systems, Inc., North York, Ontario Canada

Gambling Task (fMRI Revision 3.0.1)

Grushcow, Marc; Oct 2007; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W7711-03-7894-34

Report No.(s): AD-A475439; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475439>

The fMRI Gambling Task is a program that presents the subject with two or more decks of cards, where each card has a value associated with it. The task accumulates the value of the selected cards and the subject's goal is to make this value as large as possible. This version of the Gambling Task is designed for use in an fMRI environment. Consequently, a number of features have been added to manage timing considerations and input device characteristics.

DTIC

Game Theory; Timing Devices

20080010773 Army Research Inst. for the Behavioral and Social Sciences, Orlando, FL USA

Heuristic Evaluation of a User Interface for a Game-Based Simulation

Jerome, Christian J; Howey, Amanda M; Billings, Deborah R; Sep 2007; 21 pp.; In English

Contract(s)/Grant(s): Proj-A790

Report No.(s): AD-A475400; ARI-RN-2007-08; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475400>

This research sought to estimate the level of usability, to identify any problem areas, and to provide redesign recommendations that may improve the usability of future designs of Forterra's Online Interactive Virtual Environment (OLIVE) system as a training tool. Game interface usability might have an effect on the success of game-based simulation training programs. Three usability researchers performed a usability heuristic evaluation, documenting each problem identified, as well as the recommended solution to these problems. Three areas out of the ten usability heuristics were identified as potentially problematic: User Control and Freedom Recognition, Recognition Rather than Recall, and Help and Documentation. A number of design recommendations have been identified which should improve usability and task performance using these systems. The data can serve to enhance the existing software by incorporating additional program requirements, and can also provide an easy-to-use checklist for DoD personnel, private contractors, and researchers interested in the design and testing of game-based simulation for team training.

DTIC

Computerized Simulation; Game Theory; Graphical User Interface; Heuristic Methods; Simulation

20080010845 NASA Johnson Space Center, Houston, TX, USA

Early Design Choices: Capture, Model, Integrate, Analyze, Simulate

Malin, Jane T.; [2004]; 8 pp.; In English; Decision Based Design Structures Workshop, 7 Oct. 2004, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: [A02](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080010845>

I. Designs are constructed incrementally to meet requirements and solve problems: a) Requirements types: objectives, scenarios, constraints, ilities. etc. b) Problem/issue types: risk/safety, cost/difficulty, interaction, conflict, etc. II. Capture requirements, problems and solutions: a) Collect design and analysis products and make them accessible for integration and analysis; b) Link changes in design requirements, problems and solutions; and c) Harvest design data for design models and choice structures. III. System designs are constructed by multiple groups designing interacting subsystems a) Diverse problems, choice criteria, analysis methods and point solutions. IV. Support integration and global analysis of repercussions: a) System implications of point solutions; b) Broad analysis of interactions beyond totals of mass, cost, etc.

Derived from text

Design Analysis; Risk; Safety; Models

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*.

20080010004 Illinois Univ., Chicago, IL USA

Sea Clutter Generation and Target Detection

Canta, Stefano M; Erricolo, Danilo; Jul 2007; 26 pp.; In English

Report No.(s): AD-A475628; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Propagation model for the electromagnetic field that accounts for the clutter and metallic objects in the sea. Computationally fast, and the complete work will include electromagnetic propagation models and vector antennas.

DTIC

Clutter; Detection; Electromagnetic Wave Transmission; Models; Seas; Target Acquisition

20080010791 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Optimisation of Dallenbach Layers Using Real Materials

Saville, P; Jan 2007; 36 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475367; DRDC ATLANTIC TM 2007-012; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475367>

In this paper multilayer Dallenbach absorbers were designed using the genetic algorithm optimisation routine and known material properties. The genetic algorithm was used to provide the global minimum solution to the reflectivity performance of the absorbers. The bandwidth and reflectivity of the absorber designs depend on the number of layers, layer composition and the layer order. Successful absorber designs are those that present an impedance gradient to the electromagnetic radiation. With the limited number of materials used in this study it was possible to design an absorber with good reflectivity and bandwidth, however, the performance was not as good as found for Jaumann absorbers. Better performance may be achievable for a wider range of materials.

DTIC

Electromagnetic Radiation; Optimization

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*.

20080009763 NASA Johnson Space Center, Houston, TX, USA

Spacecraft Internal Acoustic Environment Modeling

Allen, Christopher; Chu, S. Reynold; February 04, 2008; 1 pp.; In English; Human Research Program Investigator's Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The objective of the project is to develop an acoustic modeling capability, based on commercial off-the-shelf software, to be used as a tool for oversight of the future manned Constellation vehicles to ensure compliance with acoustic requirements and thus provide a safe and habitable acoustic environment for the crews, and to validate developed models via building physical mockups and conducting acoustic measurements.

Derived from text

Acoustic Measurement; Commercial Off-the-Shelf Products; Spacecraft Environments; Acoustics; Habitability

20080009859 Defence Research and Development Canada, Dartmouth, Nova Scotia Canada

Marine Mammals and Active Sonar

FORTescue, Paul; Hole, Stein O; Robichaud, Raymond M; Sesto, Juan R; Theriault, Jim; Hensley, Robin; Weaver, Nick; Maughan, Ben; Oct 2005; 29 pp.; In English

Report No.(s): AD-A475349; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475349>

The purpose of this paper is to provide a recommendation to MILOC MG 40 for MILOC engagement with marine mammal mitigation measures, paying regard to the limited resources and special role of MILOC. (Extract from the minutes of the 35th MILOC SG dated 1 November 2004.) The paper does not provide a comprehensive review of the considerable amount of work in progress in this field. It is no more than a brief statement of common understanding of the issues with their potential significance to the MILOC community and an outline of ongoing actions to address the issues. Options and recommendations for MILOC engagement are presented in conclusion.

DTIC

Animals; Mammals; Marine Biology; Marine Mammals; Sonar

20080009886 Space and Naval Warfare Systems Center, San Diego, CA USA

Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics

Rynne, Ed; Gillette, David; Jan 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N0001405WX20851

Report No.(s): AD-A475434; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475434>

The goal of this effort was to provide use of the Flexensional Sea Test (FST) Array assembled under the Office of Naval Research (ONR) Multistatic ASW Capability Enhancement Program (MACE) as the source of underwater sounds to support active bi-static sonar capabilities for monitoring fish populations and behaviors during a September/October 2006 sea test off the coast of Maine. That sea test will be designated here as the Gulf of Maine (GoM) sea test. As the FST array hardware already existed and was suitable for the bi-static, active fish monitoring procedure planned for the GoM test, the approach for SSC-SD participation was primarily to arrange shipment of the array and support hardware to the Woods Hole Oceanographic Institute (WHOI), to install the system aboard R/V Endeavor as its operational-platform vessel, and to provide personnel for: installing the array-control equipment, operating and maintaining the installed transmission system, and removing the array-control equipment from the vessel after the sea test's end.

DTIC

Acoustics; Bistatic Reflectivity; Continental Shelves; Fishes; Imaging Techniques; Oceans; Populations; Sonar; Waveguides

20080009887 Massachusetts Inst. of Tech., Cambridge, MA USA

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics

Makris, Nicholas C; Jan 2006; 5 pp.; In English

Contract(s)/Grant(s): N000140510646

Report No.(s): AD-A475435; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475435>

The long-term goals of this program are to (1) instantaneously detect, image and spatially chart fish populations over continental-shelf scales, and (2) continuously monitor the areal densities and behavior of these fish populations over time using a novel audible frequency acoustic system (300-5000 Hz) referred to as Ocean Acoustic Waveguide Remote Sensing (OAWRS). This new method is being applied to explore the abundance, temporal and spatial distributions and behavior of fish populations in the Gulf of Maine on and near Georges Bank, a marine ecosystem being studied in the Census of Marine Life program. OAWRS is a valuable conservation tool for rapid imaging and enumeration of large scale fish populations over thousands of square kilometers to effectively monitor and manage the national fish stock.

DTIC

Acoustics; Continental Shelves; Fishes; Imaging Techniques; Oceans; Populations; Underwater Acoustics; Waveguides

20080009889 Washington Univ., Seattle, WA USA

Development of Mid-Frequency Multibeam Sonar for Fisheries Applications

Horne, John K; Jones, Christopher D; Wolfson, Mike A; Jan 2006; 8 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0670

Report No.(s): AD-A475437; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475437>

The long-term goal of this program is to investigate the utility of mid-frequency (approx. 10 kHz) acoustics to detect, enumerate, and identify pelagic fish distributions. Objectives of this research include: comparisons of fish backscatter models, models of mid frequency sound propagation, development of a mid-frequency multibeam sonar, and backscatter measurements using splitbeam echosounders and the multibeam sonar.

DTIC

Fisheries; Frequencies; Sonar

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*.

20080009863 SRI International Corp., Menlo Park, CA USA

Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT)

Yu, Z G; Krishnamurthy, Srinii; Guha, Shekhar; Nov 2006; 8 pp.; In English

Contract(s)/Grant(s): AF5400-03-SC-0006; Proj-4348

Report No.(s): AD-A475363; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475363>

Using accurate band structures of InAs, InSb, and two Hg(1-x)CdxTe alloys, we calculate the change in refractive index caused by the photoexcited electrons and holes. The effects of both free-carrier absorption (FCA) and one-photon absorption are considered. We find that the change in refractive index varies nonlinearly with the density of photoexcited carriers and that the generally neglected FCA contribution is significant in InAs, owing to its weak spin-orbit coupling.

DTIC

Energy Gaps (Solid State); Photoexcitation; Refractivity; Semiconductors (Materials)

20080009972 Northwestern Univ., Evanston, IL USA

MURI Center for Multidimensional Surface-Enhanced Sensing and Spectroscopy

VanDuyne, Richard P; Jun 30, 2007; 70 pp.; In English

Contract(s)/Grant(s): F49620-02-1-0381

Report No.(s): AD-A475542; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The MURI center for Multidimensional Surface-Enhanced Sensing and Spectroscopy seeks to develop fundamentally

new approaches to detect chemical and biological agents with unprecedented sensitivity and to provide chemical characterization of functional nanoscale materials for applications in photonics and electronics. A great deal of substantive progress has been made in all areas of this MURI project. The MURI PIs have authored or co-authored one hundred fifty three (153) peer-reviewed publications. In addition, the MURI Faculty gave approximately four hundred eighty (~480) presentations at meetings, conferences, and seminars. Peer recognition was high with the MURI Faculty receiving many prestigious awards. The highlights of the MURI project period were the election of Louis Brus and George Schatz to the U.S. National Academy of Sciences.

DTIC

Detection; Spectroscopy

20080009982 Woods Hole Oceanographic Inst., MA USA

Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean

Michel, Anna P; Sep 2007; 176 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): OCE0352278; OCE0352242

Report No.(s): AD-A475564; MIT/WHOI-2007-19; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Laser-induced breakdown spectroscopy (LIBS) possesses many of the characteristics required for in situ chemical sensing, and is a promising technique for field measurements in extreme environments. In this work, laboratory experiments validate the LIBS technique in a simulated deep ocean environment to pressures up to 2.76×10^7 Pa. A key focus of this work is the validation that select elements important for understanding hydrothermal vent fluid chemistry (Na, Ca, Mn, Mg, K, and Li) are detectable using LIBS. A data processing scheme that accurately deals with the extreme nature of laser-induced plasma formation was developed that allows for statistically accurate comparisons of spectra. The use of both single and double pulse LIBS for high pressure bulk aqueous solutions is explored and the system parameters needed for the detection of the key analytes are optimized. Using both single and double pulse LIBS, the limits of detection were found to be higher than expected as a result of the spectrometer used in this experimentation. However, the results of this validation show that LIBS possesses the characteristics to be a viable chemical sensing method for in situ analyte detection in high pressure environments like the deep ocean.

DTIC

Chemical Engineering; Detection; Laser-Induced Breakdown Spectroscopy; Oceans; Spectroscopy; Water Depth

20080009994 Tokyo Inst. of Tech., Tokyo, Japan

Development of Near-Field-Light Lens for Nano-Focusing of Atoms

Ito, Haruhiko; Jan 15, 2008; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA520906P0120

Report No.(s): AD-A475586; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The researchers made a near-field optical lens to focus Rb atoms on a nanometer spot by nanofabrication of a silicon-on-insulator wafer. They also fabricated a nano-slit to detect the focused atoms and numerically estimated the detection efficiency of Rb atoms.

DTIC

Atoms; Focusing; Lenses; Near Fields; Rubidium

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*.

20080009878 Michigan Univ., Ann Arbor, MI USA

Quantum Computing Using Superconducting Qubits

Nori, Franco; Savel'ev, S; Marchesoni, F; Zhu, B Y; Hanggi, P; Togawa, Y; Harada, K; Maeda, A; Tonomura, A; Rakhmanov, A; Apr 1, 2006; 198 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-02-1-0334; F006790

Report No.(s): AD-A475399; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475399>

We have performed research on several areas of control, with particular emphasis on quantum information processing,

quantum computing, superconducting qubits, and related topics (e.g., controlling the motion of flux lines, since their motion produces dissipation, introducing noise in the device). Summary is followed by a series of summaries of subtopics.

DTIC

Quantum Computation; Superconductivity

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*.

20080009625 University of South Florida, Tampa, FL USA

Method and program product for determining a radiance field in an optical environment

Reinersman, Phillip N., Inventor; Carder, Kendall L., Inventor; October 23, 2007; 22 pp.; In English

Contract(s)/Grant(s): NAS5-31716

Patent Info.: Filed August 25, 2004; US-Patent-7,286,214; US-Patent-Appl-SN-10/925,854; No Copyright; Avail.: CASI:

A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009625>

A hybrid method is presented by which Monte Carlo techniques are combined with iterative relaxation techniques to solve the Radiative Transfer Equation in arbitrary one-, two- or three-dimensional optical environments. The optical environments are first divided into contiguous regions, or elements, with Monte Carlo techniques then being employed to determine the optical response function of each type of element. The elements are combined, and the iterative relaxation techniques are used to determine simultaneously the radiance field on the boundary and throughout the interior of the modeled environment. This hybrid model is capable of providing estimates of the under-water light field needed to expedite inspection of ship hulls and port facilities. It is also capable of providing estimates of the subaerial light field for structured, absorbing or non-absorbing environments such as shadows of mountain ranges within and without absorption spectral bands such as water vapor or CO₂ bands.

Official Gazette of the U.S. Patent and Trademark Office

Monte Carlo Method; Radiance; Radiative Transfer; Optical Measurement; Environments

20080009688 Institute of Space Medico-Engineering, Beijing, China

Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images

Sun, Min; Li, De-yu; Yu, Meng-sun; Space Medicine and Medical Engineering: Vol. 20, No. 4; August 2007, pp. 285-288;

In Chinese; See also [20080009685](#); Copyright; Avail.: Other Sources

To develop an image analyzing procedure for automatic localization of facial features on infrared images. An unsupervised local and global features extraction method was adopted for the localization of facial features of frontal view face image. First, a threshold was used to segment the image into foreground and background, and the nose was localized by considering the symmetry of the face. Second, Harris operator was adopted to detect interest points in a rectangular area covering all the facial features, and then local maximum of the interest points were detected. And finally, K-means clustering method was used to cluster the points and obtain the facial features localization. The experimental result of 100 images demonstrated that the procedure could automatically localize eyes, nose, mouth, and distinguish the feature areas. The proposed infrared image analyzing procedure based on Harris operator and K-means clustering can be used to locate facial features on infrared image more rapidly and reliably

Author

Infrared Imagery; Pattern Recognition; Image Processing

20080009769 NASA Glenn Research Center, Cleveland, OH, USA

Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring

Banks, Bruce A., Inventor; December 04, 2007; 13 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 10 Jul. 2006; US-Patent-7,305,154; US-Patent-Appl-SN-11/483887; US-Patent-Appl-SN-10/942637;

NASA-Case-LEW-17642-4; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009769>

Disclosed is a method and the resulting product thereof comprising a solid light-conducting fiber with a point of attachment and having a textured surface site consisting of a textured distal end prepared by being placed in a vacuum and

then subjected to directed hyperthermal beams comprising oxygen ions or atoms. The textured distal end comprises cones or pillars that are spaced upon from each other by less than 1 micron and are extremely suitable to prevent cellular components of blood from entering the valleys between the cones or pillars so as to effectively separate the cellular components in the blood from interfering with optical sensing of the glucose concentration for diabetic patients.

Author

Blood; Glucose; Optical Fibers; Detection; Sensors; Diabetes Mellitus

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*.

20080009633 California Inst. of Tech., Pasadena, CA USA

Interband cascade detectors

Chuang, Shun Lien, Inventor; Li, Jian, Inventor; Yang, Rui Q., Inventor; October 16, 2007; 8 pp.; In English

Patent Info.: Filed September 15, 2005; US-Patent-7,282,777; US-Patent-Appl-SN-11/227,989; No Copyright; Avail.:

CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009633>

A device for detecting radiation, typically in the infrared. Photons are absorbed in an active region of a semiconductor device such that the absorption induces an interband electronic transition and generates photo-excited charge carriers. The charge carriers are coupled into a carrier transport region having multiple quantum wells and characterized by intersubband relaxation that provides rapid charge carrier collection. The photo-excited carriers are collected from the carrier transport region at a conducting contact region. Another carrier transport region characterized by interband tunneling for multiple stages draws charge carriers from another conducting contact and replenishes the charge carriers to the active region for photo-excitation. A photocurrent is generated between the conducting contacts through the active region of the device.

Official Gazette of the U.S. Patent and Trademark Office

Detection; Infrared Radiation; Photons; Semiconductor Devices

20080009744 NASA Ames Research Center, Moffett Field, CA, USA

Functionalization of Carbon Nanotubes

Khare, Bishun N., Inventor; Meyyappan, Meyya, Inventor; October 02, 2007; 8 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 13 Dec. 2002; US-Patent-7,276,266; US-Patent-Appl-SN-10/320698; NASA-Case-ARC-14661-1; No Copyright; Avail.:

CASI: [A02](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009744>

Method and system for functionalizing a collection of carbon nanotubes (CNTs). A selected precursor gas (e.g., H₂, or F₂, or CnHm) is irradiated to provide a cold plasma of selected target particles, such as atomic H or F, in a first chamber. The target particles are directed toward an array of CNTs located in a second chamber while suppressing transport of ultraviolet radiation to the second chamber. A CNT array is functionalized with the target particles, at or below room temperature, to a point of saturation, in an exposure time interval no longer than about 30 sec.

Official Gazette of the U.S. Patent and Trademark Office

Carbon Nanotubes; Systems Engineering; Methodology; Hydrogen; Fluorides

80

SOCIAL AND INFORMATION SCIENCES (GENERAL)

Includes general research topics related to sociology; educational programs and curricula. For specific topics in these areas see categories 81 through 85.

20080010884 NASA Johnson Space Center, Houston, TX, USA

Generation Y Perspectives

Skyland, Nicholas; Painting, Kristen; Barrera, Aaron; Fitzpatrick, Garret; February 26, 2008; 90 pp.; In English; 3rd Annual

AIAA Conference, 26-28 Feb. 2008, Denver, CO, USA; Original contains color and black and white illustrations; No Copyright; Avail.: CASI: [A05](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080010884>

This viewgraph presentation reviews the perception of NASA and the importance of engaging those people born between 1977 and 2000, also known as Generation Y. It examines some of the differences in attitudes and experiences, and how it reflects on how they view NASA. It also discusses use of the internet in connecting to the people from that generation.
CASI

General Overviews; Recommendations; NASA Programs; Space Programs; Youth

81

ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20080009617 NASA Marshall Space Flight Center, Huntsville, AL, USA

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate

Hale, Joseph P.; April 02, 2006; 13 pp.; In English; 2006 Spring Sim/Simulation Interoperability Standards Organization and The Society for Modeling and Simulation International, 2-7 Apr. 2006, Huntsville, AL, USA; Original contains black and white illustrations; No Copyright; Avail.: CASI: [A03](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080009617>

Models and simulations (M&S) are critical resources in the exploration of space. They support program management, systems engineering, integration, analysis, test, and operations and provide critical information and data supporting key analyses and decisions (technical, cost and schedule). Consequently, there is a clear need to establish a solid understanding of M&S strengths and weaknesses, and the bounds within which they can credibly support decision-making. Their usage requires the implementation of a rigorous approach to verification, validation and accreditation (W&A) and establishment of formal process and practices associated with their application. To ensure decision-making is suitably supported by information (data, models, test beds) from activities (studies, exercises) from M&S applications that are understood and characterized, ESMD is establishing formal, tailored W&A processes and practices. In addition, to ensure the successful application of M&S within ESMD, a formal process for the certification of analysts that use M&S is being implemented. This presentation will highlight NASA's Exploration Systems Mission Directorate (ESMD) management approach for M&S W&A to ensure decision-makers receive timely information on the model's fidelity, credibility, and quality.

Author

Models; Space Exploration; Simulation; Systems Engineering; Support Systems; Project Management; Proving; Decision Making

20080009655 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

The Power of a Question: A Case Study of Two Organizational Knowledge Capture Systems

Cooper, Lynn P.; January 6, 2003; 9 pp.; In English; Hawaii International Conference on System Sciences (HICSS)36, 6-9 Jan. 2003, Waikoloa Village, HI, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources
ONLINE: <http://hdl.handle.net/2014/40609>

This document represents a presentation regarding organizational knowledge capture systems which was delivered at the HICSS-36 conference held from January 6-9, 2003. An exploratory case study of two knowledge resources is offered. Then, two organizational knowledge capture systems are briefly described: knowledge transfer from practitioner and the use of questions to represent knowledge. Finally, the creation of a database of peer review questions is suggested as a method of promoting organizational discussions and knowledge representation and exchange.

Derived from text

Knowledge Representation; Information Management; Organizations

20080009765 NASA Marshall Space Flight Center, Huntsville, AL, USA

Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative

Caraccioli, Paul; Varnedoe, Tom; Smith, Randy; McCarter, Mike; Wilson, Barry; Porter, Richard; March 02, 2006; 42 pp.; In English; Managing Knowledge for Successful Mission Operations Johnson Space Flight Center, NASA Knowledge Management Team, 2-3 Mar. 2006, Houston, TX, USA; Original contains black and white illustrations
Contract(s)/Grant(s): NNM05AA44G; Copyright; Avail.: CASI: [A03](#), Hardcopy

NASA Marshall Space Flight Center's Propulsion Systems Department (PSD) is four months into a fifteen month

Knowledge Management (KM) initiative to support enhanced engineering decision making and analyses, faster resolution of anomalies (near-term) and effective, efficient knowledge infused engineering processes, reduced knowledge attrition, and reduced anomaly occurrences (long-term). The near-term objective of this initiative is developing a KM Pilot project, within the context of a 3-5 year KM strategy, to introduce and evaluate the use of KM within PSD. An internal NASA/MSFC PSD KM team was established early in project formulation to maintain a practitioner, user-centric focus throughout the conceptual development, planning and deployment of KM technologies and capabilities within the PSD. The PSD internal team is supported by the University of Alabama's Aging Infrastructure Systems Center of Excellence (AISCE), Intergraph Corporation, and The Knowledge Institute. The principle product of the initial four month effort has been strategic planning of PSD KNI implementation by first determining the 'as is' state of KM capabilities and developing, planning and documenting the roadmap to achieve the desired 'to be' state. Activities undertaken to support the planning phase have included data gathering; cultural surveys, group work-sessions, interviews, documentation review, and independent research. Assessments and analyses have been performed including industry benchmarking, related local and Agency initiatives, specific tools and techniques used and strategies for leveraging existing resources, people and technology to achieve common KM goals. Key findings captured in the PSD KM Strategic Plan include the system vision, purpose, stakeholders, prioritized strategic objectives mapped to the top ten practitioner needs and analysis of current resource usage. Opportunities identified from research, analyses, cultural KM surveys and practitioner interviews include: executive and senior management sponsorship, KM awareness, promotion and training, cultural change management, process improvement, leveraging existing resources and new innovative technologies to align with other NASA KM initiatives (convergence: the big picture). To enable results based incremental implementation and future growth of the KM initiative, key performance measures have been identified including stakeholder value, system utility, learning and growth (knowledge capture, sharing, reduced anomaly recurrence), cultural change, process improvement and return-on-investment. The next steps for the initial implementation spiral (focused on SSME Turbomachinery) have been identified, largely based on the organization and compilation of summary level engineering process models, data capture matrices, functional models and conceptual-level systems architecture. Key elements include detailed KM requirements definition, KM technology architecture assessment, - evaluation and selection, deployable KM Pilot design, development, implementation and evaluation, and justifying full implementation (estimated Return-on-Investment). Features identified for the notional system architecture include the knowledge presentation layer (and its components), knowledge network layer (and its components), knowledge storage layer (and its components), User Interface and capabilities. This paper provides a snapshot of the progress to date, the near term planning for deploying the KM pilot project and a forward look at results based growth of KM capabilities with-in the MSFC PSD.

Author

Propulsion System Configurations; Knowledge Representation; Management Planning; Systems Engineering; Systems Management

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*.

20080009710 NASA Johnson Space Center, Houston, TX, USA

Are Fullerenes Relevant to Cosmochemistry? A New Finding

Wilson, T. L.; Mittlefehldt, D. W.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: **A01**, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009710>

The abundances of noble gases found in primitive, carbonaceous meteorites are unexpected when compared with our Sun. Known as Q-gases (Q for some unknown carrier dubbed quintessence), this anomaly has remained a mystery since it was discovered in 1975. Q-gases are characterized by increasing depletions with decreasing atomic number (Z) relative to solar noble gases and normalized to ^{132}Xe (Figure 1). This Q-gas mass fractionation is unexplained, and its investigation is important to understanding the origin of the solar system. However, the subject is fraught with controversy, in part due to the complex nature of Q and in part due to claims of some researchers that cannot be reproduced by other investigators. The topic is discussed in numerous places [e.g., 1-4], with models of Q falling into two basic categories, both involving carbon entrapment of noble gases. First (Group A), there is the conservative two-dimensional view that Q-gases are adsorbed or sorbed onto a 'labyrinth' of graphite or carbon grains [5-9], or they undergo active capture onto growing surfaces [6]. Second (Group B), there is the view holding to the remarkable property of carbon discovered in 1985. Carbon can curl up into closed

geometries of hexagon- and pentagon-shaped carbon-ring configurations, a property ignored completely by Group A. Group B thinks of Q as a three-dimensional structure of endohedral carbon cages like fullerenes, carbon onions, or some class of carbon nanotubes [3, 4, 10]. Group B does not exclude Group A effects.

Derived from text

Carbonaceous Meteorites; Atomic Structure; Rare Gases; Fullerenes; Cosmochemistry; Carbon Nanotubes

20080009848 Library of Congress, Washington, DC USA

Data Mining and Homeland Security: An Overview

Seifert, Jeffrey W; Dec 5, 2007; 42 pp.; In English

Report No.(s): AD-A475315; CRS-RL31798; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475315>

Data mining has become one of the key features of many homeland security initiatives. Often used as a means for detecting fraud, assessing risk, and product retailing, data mining involves the use of data analysis tools to discover previously unknown, valid patterns and relationships in large data sets. In the context of homeland security, data mining can be a potential means to identify terrorist activities, such as money transfers and communications, and to identify and track individual terrorists themselves, such as through travel and immigration records. While data mining represents a significant advance in the type of analytical tools currently available, there are limitations to its capability. One limitation is that although data mining can help reveal patterns and relationships, it does not tell the user the value or significance of these patterns. These types of determinations must be made by the user. A second limitation is that while data mining can identify connections between behaviors and/or variables, it does not necessarily identify a causal relationship. Successful data mining still requires skilled technical and analytical specialists who can structure the analysis and interpret the output. Data mining is becoming increasingly common in both the private and public sectors. Industries such as banking, insurance, medicine, and retailing commonly use data mining to reduce costs, enhance research, and increase sales. In the public sector, data mining applications initially were used as a means to detect fraud and waste, but have grown to also be used for purposes such as measuring and improving program performance. However, some of the homeland security data mining applications represent a significant expansion in the quantity and scope of data to be analyzed.

DTIC

Data Mining; Information Retrieval; Security

20080009854 Naval War Coll., Newport, RI USA

Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights

Soderberg, Eric; Glenney, William; Nov 26, 2007; 37 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475329; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475329>

Modern Information Technology (IT) has radically magnified the capability and power of data mining. At a time when the threat environment has shifted in emphasis to COIN, terrorism, and cyber war, IT-enhanced data mining capabilities could provide some of the critical intelligence demanded by these types of threats. Yet depending on how this new capability is employed and what protections are in place, US citizen's privacy rights could be threatened. This paper establishes the intersection between the capability and need for data mining and the suitability of existing policy to enable its legitimate application. Policy recommendations are made to address the concerns discussed above and facilitate the fullest execution of the National Strategy for Information Sharing.

DTIC

Data Acquisition; Data Mining; Information Retrieval; Intelligence; Privacy

20080009857 Defence Research and Development Canada, Valcartier, Quebec Canada

Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification

Florea, Mihai C; Joussetme, Anne-Laure; Bosse, Eloi; Nov 2007; 142 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475342; DRDC-V-TR-2003-319; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475342>

This is a study of the applicability of random sets theory to target identification problems as a technique for fusion of imperfect information. For target identification, several sources of information (radar, ESM - Electronic Support Measures, SAR - Synthetic Aperture Radar, IR images) are available. Since the information provided is always imperfect and several

kinds of imperfection may be encountered (imprecision, uncertainty, incompleteness, vagueness, etc.), several theories were developed to assist probability theory (long the only tool available to deal with uncertainty) in data fusion problems. In recent decades fuzzy sets theory was developed to deal with vague information, possibility theory was developed to deal with incomplete information, evidence theory was developed to deal with imprecise and uncertain information, and rough sets theory was developed to deal with vague and uncertain information. These theories have several points in common; here we study random sets theory, which is a unifying framework for all the aforementioned theories. In two simple test scenarios, we demonstrate the effectiveness of this unifying framework for representing and fusing imperfect information in the target identification application.

DTIC

Detection; Information Theory; Multisensor Fusion; Set Theory; Target Acquisition; Targets

20080009860 Industrial Coll. of the Armed Forces, Washington, DC USA

Spring 2006. Industry Study. Information Technology Industry

Jan 2006; 39 pp.; In English

Report No.(s): AD-A475353; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475353>

The U.S. Information Technology (IT) industry is both a specific industry and a foundational element for all other major industries. While the industry is strong and can support current National Security Strategy (NSS) requirements, the U.S. must address upcoming challenges to continue enabling and protecting our current and future strategic capabilities. By building and promoting relationships among government, industry and academia, the U.S. government (USG) can overcome the challenges of maintaining a strong IT workforce, protecting critical infrastructures and technologies, managing our intellectual property rights, and transforming our industrial-based military to continue leading the world in innovation and technological superiority.

DTIC

Industries; Information Systems

20080009866 Defence Research and Development Canada, Valcartier, Quebec Canada

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools

Couture, Mario; Sep 2007; 366 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475370; DRDC VALCARTIER TN 2006-450; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475370>

This report is a starting point reference for the search of information on Complexity Theory, chaos and complex systems. This document aims at assembling a number of references to relevant books, papers, experts and organizations as well as tools that are directly or indirectly related to Complexity Theory and complex systems. Many abstracts and additional comments are added to each reference for completeness. This document is the first of a set of five DRDC Valcartier reports dedicated to the study of complexity theory, chaos and complex systems. [See p3/PDF p17 for titles and descriptions.] It is part of an overarching project being carried on at DRDC Valcartier, Project 15bp01 Defensive Software Design. It focuses mainly on the presentation of concepts from this theory. There are only a few references to the architecting and engineering aspects of complexity. These aspects will be covered in another document. This report contains 471 references to scientific works, organizations, scientific journals, conferences, experts and tools plus 713 additional Internet addresses.

DTIC

Abstracts; Bibliographies; Chaos; Conferences; Organizations; Systems Analysis

20080009868 Industrial Coll. of the Armed Forces, Washington, DC USA

News Media Industry

Bagnati, Dave; Ferguson, Howard; Girven, Rich; Seng, Jocelyn; Herr, Sean; Hummer, Eric; Kaufman, Rob; Druggan, Tom; Kinder, Joseph; Aceto, Paul; Jan 2006; 34 pp.; In English

Report No.(s): AD-A475374; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475374>

The American news media industry is characterized by two competing dynamics -- traditional journalistic values and market demands for profit. Most within the industry consider themselves to be journalists first. In that capacity, they fulfill two

key roles: providing information that helps the public act as informed citizens, and serving as a watchdog that provides an important check on the power of the American government. At the same time, the news media is an extremely costly, market-driven, and profit-oriented industry. These sometimes conflicting interests compel the industry to weigh the public interest against what will sell. Moreover, several fast-paced trends have emerged within the industry in recent years, driven largely by changes in technology, demographics, and industry economics. They include consolidation of news organizations, government deregulation, the emergence of new types of media, blurring of the distinction between news and entertainment, decline in international coverage, declining circulation and viewership for some of the oldest media institutions, and increased skepticism of the credibility of 'mainstream media.' Looking ahead, technology will enable consumers to tailor their news and access it at their convenience -- perhaps at the cost of reading the dull but important stories that make an informed citizenry. Changes in viewer preferences -- combined with financial pressures and fast-paced technological changes -- are forcing the mainstream media to re-examine their long-held business strategies. These changes will continue to impact the media's approach to the news and the profitability of the news industry. Though the number of news gatherers is falling in proportion to the news sources, the diversification of the means by which consumers can access news bodes well for an American public that takes pride in free and open access to information.

DTIC

Broadcasting; Forecasting; Industries; Internets; News Media; Technology Assessment; Television Systems

20080009991 Princeton Univ., NJ USA

Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings

Kutyniok, Gitta; Pezeshki, Ali; Calderbank, Robert; Liu, Taotao; Sep 13, 2007; 23 pp.; In English

Report No.(s): AD-A475579; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We consider estimating a random vector from its noisy projections onto low-dimensional subspaces constituting a fusion frame. A fusion frame is a collection of subspaces, for which the sum of the projection operators onto the subspaces is bounded below and above by constant multiples of the identity operator. We first determine the minimum mean-squared error (MSE) in linearly estimating the random vector of interest from its fusion frame projections, in the presence of white noise. We show that MSE assumes its minimum value when the fusion frame is tight. We then analyze the robustness of the constructed linear minimum MSE (LMMSE) estimator to erasures of the fusion frame subspaces. We prove that tight fusion frames consisting of equi-dimensional subspaces have maximum robustness (in the MSE sense) with respect to erasures of one subspace, and that the optimal subspace dimension depends on signal-to-noise ratio (SNR). We also prove that tight fusion frames consisting of equi-dimensional subspaces with equal pairwise chordal distances are most robust with respect to two and more subspace erasures. We call such fusion frames equi-distance tight fusion frames, and prove that the chordal distance between subspaces in such fusion frames meets the so-called simplex bound and thereby establish connections between equi-distance tight fusion frames and optimal Grassmannian packings. Finally, we present several examples for construction of equi-distance tight fusion frames.

DTIC

Multisensor Fusion; Vector Analysis

20080009993 Air Command and Staff Coll., Maxwell AFB, AL USA

The American Military and the Media: Historical Lessons and Future Considerations

Burns, Brian D; Apr 2006; 32 pp.; In English

Report No.(s): AD-A475585; AU/ACSC/44-1181/2005-06; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Media coverage of military operations has been around for centuries, and has evolved as much as the technologies and tactics with which war is fought today. It is also in the early origins of the military-media relationship that one can see the seeds of certain characteristics that seem to run common throughout history. This research paper discusses the U.S. military-media relationship, beginning with a brief history of the media at war up to the Vietnam conflict. With the war in Southeast Asia came a different set of rules for those covering the war which redefined the way the American public viewed war and the military. Through the lessons learned from that conflict along with advances in satellite technology came the 'modern era' of news coverage as seen during Operation Desert Storm. This real-time reporting forced the military to reevaluate its relationship with the media and realize that news coverage must be considered before hostilities begin, not as an afterthought upon completion of the plan. Did the military learn its lesson by placing embedded reporters with the troops during Operation Iraqi Freedom (OIF)? What could have been done better by both sides of this forced brotherhood? In addition to this relationship, the paper discusses the media's motivation to report in the manner that they do, and evaluates the evidence for liberal or conservative biases by major news sources. The paper also offers suggestions and recommendations for future

operations based on some fundamental truths and characteristics of both sides of the military-media relationship, with a focus on the programs and procedures that the U.S. military can control to foster a cooperative relationship with the media. The military cannot ignore the importance of information and of public opinion in a democracy like the USA, for it can have decisive consequences for the outcomes of future conflicts.

DTIC

Histories; Military Operations; News Media; Policies; Telecommunication

20080009997 Army Command and General Staff Coll., Fort Leavenworth, KS USA

Applying Knowledge Management Theory to Army Doctrine Development: Case Study of a Web-Based Community of Practice

Robertson, Gregory D; Dec 14, 2007; 103 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475596; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study addresses the question of whether knowledge management is an appropriate strategy for revising the Army doctrine development process in the contemporary operational environment (COE). The author applies knowledge management theory to the proposed web-based Army Field Manual (FM) 7-1, 'Battle Focused Training,' and then to the Army's overall doctrine development process. The results show that knowledge management provides only a partial solution to the problems of consistency and timeliness in the doctrine development process, and that knowledge management cannot solve the problem of validating and testing doctrine. He concludes that only if the doctrine development process is revised in accordance with the principles of knowledge management and Chris Argyris' theory of double-loop learning will the problems of validation, consistency, and timeliness of doctrine development be solved.

DTIC

Education; Information Management

20080009998 Federal Aviation Administration, Washington, DC USA

Information Complexity in Air Traffic Control Displays

Jing, Xing; Sep 2007; 22 pp.; In English

Report No.(s): AD-A475598; DOT-FAA-AM-07-26; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Air traffic controllers typically use visual displays to interact with various automation systems. Automation tools are intended to reduce controller task load, but they may also create new tasks associated with acquiring, integrating, and utilizing information from displays. Consequently, the complexity of information displayed may reduce the efficiency and effectiveness of an automation system. Moreover, complexity could cause controllers to miss or misinterpret visual data, thereby reducing safety. Thus, information complexity in air traffic control (ATC) displays represents a potential bottleneck in ATC systems. To evaluate the cost and benefit of an automation system, it is important to understand whether the information it provides is too complex for controllers to process. The purpose of this study was to answer three basic questions: (1) What constitutes information complexity in automation displays?; (2) What level of display complexity is 'too complex' for controllers? and (3) Can we objectively measure information complexity in ATC displays? In this study, we first developed a general framework for measuring information complexity. The framework reduces the concept of complexity into three underlying factors: quantity, variety, and the relations between basic information elements; each factor is evaluated at three generic stages of human information processing: perception, cognition, and action. By this definition, we decompose complexity into a 3x3 matrix, measuring the effects of a complexity factor on information processing at a given stage. We then take the following steps to develop complexity metrics for ATC displays: (1) Identify task requirements of using the displays in ATC; (2) Determine corresponding brain functions pertinent to the task requirements; and (3) Choose the metric that can measure the effects of the complexity factor on the brain functions.

DTIC

Air Traffic Control; Data Processing; Display Devices; Visual Aids

20080010620 NASA Johnson Space Center, Houston, TX, USA

NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance

Stroud, Kenneth; Pickett, Lynn; Tillman, Barry; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.:

CASI: A01, Hardcopy

This poster presentation reviews the Human Integration Design Handbook (HIDH). It provides guidance and data to aid

vehicle / habitat designers in human-system integration It also aids requirements writers in development of human-system integration requirements from SFHSS Standards

CASI

Handbooks; Human Factors Engineering; Manuals

20080010748 Tulsa Univ., OK USA

Fuselet Workflow Inspection and Feedback

Gamble, Rose; Baird, Robert; Dec 2007; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-06-2-0059; Proj-FUSE

Report No.(s): AD-A475413; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475413>

The main goal of this effort is the introduction of the concept of a reconfigurable workflow of Fuselet processes into the Joint Battlespace Infosphere (JBI). The marriage of information manipulation and Web services has the potential to increase the netcentric capabilities of the JBI by making it easier to gain access to only needed or pre-processed information designated by a Community of Interest (COI). This technology is especially needed to accommodate the migration of clients accessing the JBI and the JBI itself to Web services. Coordination and orchestration of Fuselets as Web services within the current Fuselet Runtime Environment (FRE) are fundamental to the changes needed for this migration, requiring new construction, deployment, and management technology to be used by the Information Management Staff. The novel outcome of the research is a system design that is poised to support dynamic reconfiguration in the form of policy changes, workflow definition updates, environmental changes, MIO versioning, and changing Fuselet services or locations.

DTIC

Data Management; Feedback; Information Systems; Inspection; Internets; Web Services

20080010769 Air Force Research Lab., Rome, NY USA

Survey of Event Processing

Owens, Thomas J; Dec 2007; 23 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475386; AFRL-RI-RS-TM-2007-16; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475386>

In the past decade, event processing technology has exploded from research at universities to a number of commercial products. In this paper, event processing technology will be reviewed, starting with the motivations behind its development and ending with a look into the future of event processing. A number of important topics closely related to event processing will also be examined, including applications of the technology, various academic and commercial implementations, event processing languages, and benchmarking techniques for event processing engines.

DTIC

Data Processing; Information Retrieval; Surveys

20080010788 Air Force Research Lab., Rome, NY USA

Multimedia Information Extraction

Budlong, Emily; Dec 2007; 12 pp.; In English; Original contains color illustrations

Report No.(s): AD-A475383; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ONLINE: <http://hdl.handle.net/100.2/ADA475383>

This paper describes the need for information extraction technologies within the military, some of the current technologies available, and the problems associated with them. It also looks at some of the ongoing research projects in areas of multimedia information extraction. Finally, it looks at the StreamSage audio extraction software and the demonstration of this software, explains how to run the software and the demo, and evaluates them.

DTIC

Extraction; Information Retrieval; Multimedia

20080010794 Defence Research and Development Canada, Ottawa, Ontario Canada

Development and Results of CORA DWAN Website Survey

Desai, Soni; Oct 2006; 30 pp.; In English

Report No.(s): AD-A475540; DRDC-CORA-TN-2006-09; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A CORA committee has been struck to revamp the CORA DWAN website (<http://ord.mil.ca>). An online survey was developed and administered to all CORA employees on their website usage, what they like and do not like about the website, and what new features they would like to see added to the website. The survey found that the majority of CORA employees have in fact visited the website in the last six months, like the format and content of the website, don't like that the content is so out of date, and have some creative suggestions for new features for the website. This technical note concludes with a set of recommendations on the revamping of the CORA DWAN website and on administering surveys online.

DTIC

Internets; Surveys; User Requirements; Websites

88

SPACE SCIENCES (GENERAL)

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through 93*.

20080009602 NASA Johnson Space Center, Houston, TX, USA

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbide Target 60001

Allton, J. H.; Calaway, M. J.; Rodriguez, M. C.; [2008]; 2 pp.; In English; 39th Lunar Planetary Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Genesis spacecraft concentrator was a device to focus solar wind ions onto a 6-cm diameter target area, thus concentrating the solar wind by 20X [1]. The target area was comprised of 4 quadrants held in place by a gold-coated stainless steel 'cross' (Fig. 1). To date, two SiC and one chemical vapor deposited (CVD) quadrants have been imaged at 5X using a Leica DM-6000M in autoscanner mode. Complete imaging of SiC sample 60001 required 1036 images. The mosaic of images is shown in Fig. 2 and position of analyzed areas in Fig. 3. This mosaic imaging is part of the curatorial documentation of surface condition and mapping of contamination. Higher magnification (50X) images of selected areas of the target and individual contaminant particles are compiled into reports which may be requested from the Genesis Curator [2].

Derived from text

Imaging Techniques; Targets; Silicon Carbides; Solar Wind; Quadrants; Concentrators; Genesis Mission

20080009610 NASA Johnson Space Center, Houston, TX, USA

Curation of Frozen Samples

Fletcher, L. A.; Allen, C. C.; Bastien, R.; [2008]; 2 pp.; In English; 39th Annual Lunar Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NNJ07HE26P; Copyright; Avail.: CASI: [A01](#), Hardcopy

NASA's Johnson Space Center (JSC) and the Astromaterials Curator are charged by NPD 7100.10D with the curation of all of NASA's extraterrestrial samples, including those from future missions. This responsibility includes the development of new sample handling and preparation techniques; therefore, the Astromaterials Curator must begin developing procedures to preserve, prepare and ship samples at sub-freezing temperatures in order to enable future sample return missions. Such missions might include the return of future frozen samples from permanently-shadowed lunar craters, the nuclei of comets, the surface of Mars, etc. We are demonstrating the ability to curate samples under cold conditions by designing, installing and testing a cold curation glovebox. This glovebox will allow us to store, document, manipulate and subdivide frozen samples while quantifying and minimizing contamination throughout the curation process.

Author

Freezing; Comet Nuclei; Lunar Craters; Mars Surface

20080009714 Space Environment Technologies, Pacific Palisades, CA, USA

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather

Tobiska, W. Kent; Proceedings of the 48th AIAA Aerospace Sciences Meeting and Exhibit; January 07, 2008, pp. 73-82; In English; 48th AIAA Aerospace Sciences Meeting and Exhibit, 7-10 Jan. 2008, Reno, NV, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NNH05CD15C; NAG5-11408

Report No.(s): AIAA Paper-2008-453; Copyright; Avail.: CASI: [A02](#), Hardcopy

Precision satellite orbit determination, constellation station-keeping, debris avoidance, reentry timing, satellite subsystem performance and s&y, and communication link enhancement are among the major technological activities that are affected by space weather. We report on progress towards providing applications and services that mitigate adverse effects caused by space weather. In particular, Space Environment Technologies (SET) has developed a new automated forecast update capability. This is for new solar indices that reduce 1-sigma uncertainty by 50% in atmosphere density calculations and new solar radiances that capture solar flare effects on transionospheric communication. The solar products have been developed and tested for: 1) daily time resolution in historical, nowcast, and intermediate-term forecast periods with 1-day granularity, 1-hour cadence, and 1-hour latency extending 4.5 months; 2) high time resolution for recent, nowcast, and short-term forecast periods with 3-hour granularity, 1-hour cadence, and 1-hour latency extending 96 hours; and 3) precision time resolution for recent, current epoch, and near-term forecast periods with 1-minute granularity, 2-minute cadence, and 5-minute latency extending 6 hours. With this automated update capability, these indices and solar irradiances can be used to improve atmosphere density and ionosphere models' outputs for space systems users in satellite operational orbit planning and communication activities.

Author

Space Weather; Atmospheric Density; Ionospheric Propagation; Solar Radiation; Forecasting; Aerospace Environments; Communication Networks

20080009752 NASA Johnson Space Center, Houston, TX, USA

Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites

Zolensky, Michael E.; Ohsumi, Kazumasa; Mikouchi, Takashi; Hagiya, Kenji; Le, Loan; March 10, 2008; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The main long-term goal of this research is to understand the physical conditions in the early solar nebula through the detailed characterization of a key class of mineral present in all primitive materials: Fe-Ni sulfides [1&2]. Fe-Ni sulfides can take dozens of structures, depending on the temperature of formation, as well as other physico-chemical factors which are imperfectly understood. Add to this the additional varying factor of Ni content, and we have a potentially sensitive cosmo-thermometer [3]. Unfortunately, this tool requires exact knowledge of the crystal structure of each grain being considered, and there have been few (none?) studies of the detailed structures of sulfides in chondritic materials. We report here on coordinated compositional and crystallographic investigation of Fe-Ni sulfides in diverse carbonaceous chondrites, initially Acfer 094 (the most primitive CM2 [4]) Tagish Lake (a unique type C2 [5]), a C1 lithology in Kaidun [6], Bali (oxidized CV3 [7]), and Efremovka (reduced CV3 [7]).

Author

Carbonaceous Chondrites; Crystallinity; Lithology; Minerals; Crystal Structure

20080010142 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Conversations with Rebecca Spyke Keiser. Interview by Frank Sietzen

Aerospace America; September 2007; ISSN 0740-722X; Volume 45, No. 9, pp. 12-14; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

This paper presents an interview with Rebecca Spyke Keiser, who elaborates on her background in international relations, to negotiating with the Japanese about the International Space Station, and eventually becoming assistant to the director for international relations at the Office of Science and Technology Policy (OSTP).

CASI

International Relations; International Space Station; NASA Programs; Technology Utilization

20080010814 NASA Johnson Space Center, Houston, TX, USA

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics

Ming, D. W.; Morris, R. V.; Woida, R.; Sutter, B.; Lauer, H. V.; Shinohara, C.; Golden, D. C.; Boynton, W. V.; Arvidson, R. E.; Stewart, R. L.; Tamppari, L. K.; Gross, M.; Smith, P., et al.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Mars 2007 Phoenix Scout Mission successfully launched on August 4, 2007, for a 10-month journey to Mars. The Phoenix spacecraft is scheduled to land on May 25, 2008. The primary mission objective is to study the history of water and evaluate the potential for past and present habitability in Martian arctic ice-rich soil [1]. Phoenix will land near 68 N latitude on polygonal terrain presumably created by ice layers that are expected to be a few centimeters under loose soil materials [2,3]. The Phoenix Mission will assess the potential for habitability by searching for organic molecules in ice or icy soils at the landing site. Organic molecules are necessary building blocks for life, although their presence in the ice or soil does not indicate life itself. Phoenix will search for organic molecules by heating soil/ice samples in the Thermal and Evolved-Gas Analyzer (TEGA, [4]). TEGA consists of 8 differential scanning calorimeter (DSC) ovens integrated with a magnetic-sector mass spectrometer with a mass range of 2-140 daltons [4]. Endothermic and exothermic reactions are recorded by the TEGA DSC as samples are heated from ambient to approx.1000 C. Evolved gases, including organic molecules and fragments if present, are simultaneously measured by the mass spectrometer during heating.

Author

Soil Sampling; Mars Missions; Landing Sites; Calorimeters; Terrain; Soils; Gas Analysis; Gas Detectors; Exothermic Reactions; Endothermic Reactions

20080010846 NASA Johnson Space Center, Houston, TX, USA

Human Space Flight

Woolford, Barbara; Mount, Frances; Handbook of Human Factors and Ergonomics; January 2004; 29 pp.; In English; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The first human space flight, in the early 1960s, was aimed primarily at determining whether humans could indeed survive and function in micro-gravity. Would eating and sleeping be possible? What mental and physical tasks could be performed? Subsequent programs increased the complexity of the tasks the crew performed. Table 1 summarizes the history of U.S. space flight, showing the projects, their dates, crew sizes, and mission durations. With over forty years of experience with human space flight, the emphasis now is on how to design space vehicles, habitats, and missions to produce the greatest returns to human knowledge. What are the roles of the humans in space flight in low earth orbit, on the moon, and in exploring Mars?

Author

Spacecrews; Low Earth Orbits; Habitats; Mental Performance; Crew Size; Eating

90

ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20080009611 NASA Johnson Space Center, Houston, TX, USA

Collisional Processing of Olivine and Pyroxene in Cometary Dust

Lederer, S. M.; Cintala, M. J.; Olney, R. D.; Keller, L. P.; Nakamura-Messenger, K.; Zolensky, M.; [2008]; 1 pp.; In English; 39th Annual Lunar Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Copyright; Avail.: Other Sources; Abstract Only

According to the nebular theory of solar-system formation, collisions between bodies occurred frequently early in the solar system's history and continue at a lower rate even today. Collisions have reworked the surface compositions and structures of cometary nuclei, though to an unknown degree. The majority of the collisional history of a typical Jupiter-family comet takes place while it resides in the Kuiper Belt. Impacts occur on the surfaces of small bodies over a large range of velocities by impactors of all sizes, but typical encounter speeds within the Kuiper Belt are 1.5 to 2.0 km/s [1]. Durda and Stern suggest that the interiors of most cometary nuclei with diameters <5 km have been heavily damaged by collisions [2]. They estimate that over a period of 3.5 Gy, a nucleus with a diameter of 2 km and an orbit between 35-45 AU will experience 90-300 collisions with objects greater than 8 m in diameter. In this same time interval, collisions between a typical Trans-Neptunian Object (TNO) 200 km in diameter and objects with $d > 8$ m would rework up to one-third of that TNO's surface. In fact, it

has been proposed that most short-period comets from the Kuiper Belt (90%) are collisional fragments from larger TNOs - not primordial objects themselves [3] - and that most short-period comets from the Kuiper Belt will be collisionally processed both on their surfaces as well as in their interiors.

Author

Comets; Dust; Pyroxenes; Olivine; Collisions; Comet Nuclei; Impactors; Trans-Neptunian Objects

20080009707 NASA Johnson Space Center, Houston, TX, USA

Coordinated Chemical and Isotopic Studies of GEMS in IDPs

Keller, L. P.; Messenger, S.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: [A01](#), Hardcopy
ONLINE: <http://hdl.handle.net/2060/20080009707>

Cometary IDPs contain a record of the building blocks of the solar system including presolar grains, molecular cloud material, and materials formed in the early solar nebula [1]. Following their accretion, these materials have remained relatively unaltered because of the lack of parent body hydrothermal alteration. We are using coordinated transmission electron microscope (TEM) and ion microprobe studies to establish the origins of the various components within cometary IDPs. Of particular interest is the nature and abundance of presolar silicates in these IDPs because astronomical observations suggest that crystalline and amorphous silicates are the dominant grain types produced in young main sequence stars and evolved O-rich stars [e.g. 2]. Amorphous silicates (in the form of GEMS grains) are a major component of cometary IDPs and so a major objective of this work is to elucidate their origins. In rare cases, GEMS grains have highly anomalous O isotopic compositions that establish their origins as circumstellar condensates [3]. Here we present data on a systematic study of the silicate components within a primitive IDP.

Author

Molecular Clouds; Solar Nebula; Electron Microscopes; Main Sequence Stars; Stellar Envelopes; O Stars

20080009708 NASA Johnson Space Center, Houston, TX, USA

N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite

Messenger, S.; Nakamura-Messenger, K.; Keller, Lindsay P.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; CD-ROM contains full text document in PDF format; Copyright; Avail.: CASI: [A01](#), Hardcopy

Organic matter in primitive meteorites and chondritic porous interplanetary dust particles (CP IDPs) is commonly enriched in D/H and $^{15}\text{N}/^{14}\text{N}$ relative to terrestrial values [1-3]. These anomalies are ascribed to the partial preservation of presolar cold molecular cloud material [1]. Some meteorites and IDPs contain m-size inclusions with extreme H and N isotopic anomalies [2-4], possibly due to preserved pristine primordial organic grains. We recently showed that in the Tagish Lake meteorite, the principle carriers of these anomalies are sub- μm , hollow organic globules [5]. The globules likely formed by photochemical processing of organic ices in a cold molecular cloud or the outermost regions of the protosolar disk [5]. We proposed that similar materials should be common among primitive meteorites, IDPs, and comets. Similar objects have been observed in organic extracts of carbonaceous chondrites [6-8], however their N and H isotopic compositions are generally unknown. Bulk H and N isotopic compositions may indicate which meteorites best preserve interstellar organic compounds. Thus, we selected the Bells CM2 carbonaceous chondrites for study based on its large bulk ^{15}N (+335 %) and D (+990 %) [9].

Derived from text

Meteorites; Molecular Clouds; Carbonaceous Chondrites; Photochemical Reactions; Isotopes; Interplanetary Dust

20080009709 NASA Johnson Space Center, Houston, TX, USA

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle

Nakamura-Messenger, K.; Keller, L. P.; Clemett, S. J.; Jones, J. H.; Palma, R. L.; Pepin, R. O.; Kloeck, W.; Zolensky, M. E.; Messenger, S.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Comet 26P/Grigg-Skjellerup was identified as a source of an Earth-crossing dust stream with low Earth-encounter velocities, with peak anticipated fluxes during April in 2003 and 2004 [1]. In response to this prediction, NASA performed dedicated stratospheric dust collections using high altitude aircraft to target potential interplanetary dust particles (IDPs) from this comet stream in April 2003. Several IDPs from this collection have shown unusually low noble gas abundances [2] consistent with the predicted short space exposure ages of Grigg-Skjellerup dust particles [1]. High abundances of large D

enrichments [3] and presolar grains [4] in IDPs from this collection are also consistent with an origin from the comet Grigg-Skjellerup. Here we report a new mineral from one of the cluster IDPs of the 'Grigg-Skjellerup' collection, L2055. Our report focuses on an unusual manganese-iron-chromium silicide phase that, to our knowledge, has not been observed previously in nature. This unique phase may also shed light on the genesis of the enigmatic low-Fe,Mn-enriched (LIME) olivine that has been previously reported in IDPs and meteorites [5].

Author

Manganese; Silicides; Interplanetary Dust; Grigg-Skjellerup Comet; Minerals; Comets; Meteorites; Olivine

20080009719 NASA Johnson Space Center, Houston, TX, USA

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148

Righter, M.; Lapen, T.; Righter, K.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Achondritic meteorites are a diverse group of meteorites that formed by igneous activity in asteroids. These meteorites can provide important information about early differentiation processes on asteroidal bodies. The howardite-eucrite-diogenite (HED) meteorites, the largest group of achondrites, are the only group of meteorites for which a potential parent body has been identified (4 Vesta) [e.g., 1]. Mesosiderites are stony-iron meteorites composed of roughly equal amounts of metal and silicates and silicates are broadly similar to HED meteorites [2]. They may have been formed by impact-mixing of crustal and core materials of differentiated meteorite parent bodies. Chemical and oxygen isotopic compositional data suggest that the HED meteorites and silicate portions of mesosiderites originated on the same or closely related parent bodies. Pallasites and IIIAB irons also have similar oxygen isotope compositions and have been thought to be related to the HEDs [3,4]. However, recent high resolution analyses have shown that pallasites and HED's have different oxygen isotopic values, but mesosiderites and HED s have the same isotope compositions implying a close connection [5]. QUE 93148 is a small (1.1g) olivine-rich (mg 86) achondrite that contains variable amounts of orthopyroxene (mg 87) and kamacite (6.7 wt% Ni), with minor augite [6]. This meteorite was originally classified as a lodranite [7], but its oxygen isotopic composition precludes a genetic relationship to the acapulcoites and lodranites. And also this meteorite has a lower Mn/Mg ratio than any major group of primitive or evolved achondrites and suggested that QUE 93148 may be a piece of the deep mantle of the HED parent body [6]. To better understand the relationship between HED s, mesosiderites and related achondrites, we have measured trace elements in the individual metallic and silicate phases. In this study, abundances of a suite of elements were measured for the unusual mesosiderite RKPA 79015 and a ungrouped achondrite QUE93148.

Derived from text

Achondrites; Meteorites; Meteoritic Composition; Trace Elements; Composition (Property); Iron Meteorites; Kamacite; Asteroids

20080009735 NASA Johnson Space Center, Houston, TX, USA; Osaka Univ., Toyonaka, Japan

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact

Iida, Y.; Tsuchiyama, A.; Kadono, T.; Nakamura, T.; Sakamoto, K.; Nakano, T.; Uesugi, K.; Zolensky, M. E.; [March 10, 2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Impact tracks formed by cometary dust capture in silica aerogel collectors in the Stardust mission [1] have a variety of shapes, showing diversity of the cometary dust [2]. We have investigated 3-D structures and elemental distributions of three impact tracks using synchrotron radiation x-ray analyses (microtomography and XRF) as one of the preliminary examination [3]. In this study, additional five tracks were investigated by the same analytical method. Impactor sizes of the tracks were estimated from the track entrance sizes and Fe abundances. Size parameters, such as length, of the tracks were normalized by the impactor size to compare track shape

Derived from text

Aerogels; Stardust Mission; Shapes; Impactors; Comets; Dust; Silicon Dioxide; Accumulators

20080009736 NASA Johnson Space Center, Houston, TX, USA

Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2

[March 10 2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

We have analyzed a collection of the Comet Wild 2 coma grains returned by the NASA Stardust Mission, using micro-area

Laue diffraction equipment. The purpose of the diffraction experiment is to permit the structure refinement of olivine including site occupancies. In addition to the intrinsic importance of the olivine structures for revealing the thermal history of Wild 2 materials, we wish to test reports that olivine recovered after hypervelocity capture in silica aerogel has undergone a basic structural change due to capture heating [1]. The diffraction equipment placed at beam line BL- 4B1 of PF, KEK was developed with a micropinhole and an imaging plate (Fuji Co. Ltd.) using the Laue method combined with polychromatic X-ray of synchrotron radiation operated at energy of 2.5 GeV. The incident beam is limited to 1.6 m in diameter by a micropinhole set just upstream of the sample [2, 3]. It is essential to apply a microbeam to obtain diffracted intensities with high signal to noise ratios. This equipment has been successfully applied to various extraterrestrial materials, including meteorites and interplanetary dust particles [4]. The Laue pattern of the sample C2067,1,111,4 (Fig. 1) was successfully taken on an imaging plate after a 120 minute exposure (Fig. 2).

Author

X Ray Diffraction; Wild 2 Comet; Synchrotron Radiation; Interplanetary Dust; Extraterrestrial Matter; Olivine

20080010835 NASA Johnson Space Center, Houston, TX, USA

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani

Wiseman, S. M.; Avidson, R. E.; Murchie, S.; Poulet, F.; Andrews-Hanna, J. C.; Morris, R. V.; Seelos, F. P., et al.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Several phyllosilicate and hydrated sulfate deposits in Meridiani have been mapped in detail with high resolution MRO CRISM [1] data. Previous studies have documented extensive exposures of outcrop in Meridiani (fig 1), or etched terrain (ET), that has been interpreted to be sedimentary in origin [e.g., 2,3]. These deposits have been mapped at a regional scale with OMEGA data and show enhanced hydration (1.9 m absorption) in several areas [4]. However, hydrated sulfate detections were restricted to valley exposures in northern Meridiani ET [5]. New high resolution CRISM images show that hydrated sulfates are present in several spatially isolated exposures throughout the ET (fig 1). The hydrated sulfate deposits in the valley are vertically heterogeneous with layers of mono and polyhydrated sulfates and are morphologically distinct from other areas of the ET. We are currently mapping the detailed spatial distribution of sulfates and searching for distinct geochemical horizons that may be traced back to differential ground water recharge and/or evaporative loss rates. The high resolution CRISM data has allowed us to map out several phyllosilicate deposits within the fluvially dissected Noachian cratered terrain (DCT) to the south and west of the hematite-bearing plains (Ph) and ET (fig 1). In Miyamoto crater, phyllosilicates are located within ~30km of the edge of Ph, which is presumably underlain by acid sulfate deposits similar to those explored by Opportunity. The deposits within this crater may record the transition from fluvial conditions which produced and/or preserved phyllosilicates deposits to a progressively acid sulfate dominated groundwater system in which large accumulations of sulfate-rich evaporites were deposited .

Derived from text

Sulfates; Outcrops; Terrain; Etching; Sedimentary Rocks; Geochemistry; Mars Surface; Mineral Deposits

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*.

20080009609 NASA Johnson Space Center, Houston, TX, USA

Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites

Debaille, V.; Brandon, A. D.; Yin, Q.-Z.; Jacobsen, B.; [2008]; 2 pp.; In English; 39th Annual Lunar Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

It is now generally accepted that the heat produced by accretion, short-lived radioactive elements such as Al-26, and gravitational energy from core formation was sufficient to at least partially melt the silicate portions of terrestrial planets resulting in a global-scale magma ocean. More particularly, in Mars, the geochemical signatures displayed by shergottites, are likely inherited from the crystallization of this magma ocean. Using the short-lived chronometer Sm-146 - Nd-142 ($t(\text{sup } 1/2) = 103 \text{ Myr}$), the duration of the Martian magma ocean (MMO) has been evaluated to being less than 40 Myr, while recent and more precise ND-142/ND-144 data were used to evaluate the longevity of the MMO to approximately 100 Myr after the solar system formation. In addition, it has been proposed that the end of the crystallization of the MMO may have triggered

a mantle overturn, as a result of a density gradient in the cumulate layers crystallized at different levels. Dating the mantle overturn could hence provide additional constraint on the duration of the MMO. Among SNC meteorites, nakhlites are characterized by high epsilon W-182 of approximately +3 and an epsilon Nd-142 similar to depleted shergottites of +0.6-0.9. It has hence been proposed that the source of nakhlites was established very early in Mars history (approximately 8-10 Myr). However, the times recorded in HF-182-W-182 isotope system, i.e. when ^{182}Hf became effectively extinct (approximately 50 Myr after solar system formation) are less than closure times recorded in the Sm-146-Nd-142 isotope system (with a full coverage of approximately 500 Myr after solar system formation). This could result in decoupling between the present-day measured epsilon W-182 and epsilon Nd-142 as the SM-146 may have recorded later differentiation events in epsilon ND-142 not observed in epsilon W-182 values. With these potential complexities in short-lived chronological data for SNC's in mind, new Hf-176/Hf-177, Nd-143/Nd-144 and Nd-142/Nd-144 were obtained for three nakhlites (Nakhla, MIL03346 and Yamato000593). These new data are combined with previous epsilon W-182 data, to investigate potential discrepancies between the Hf-182-W-182 and Sm-146-Nd-142 systematics, and the relationship between the source of nakhlites and a crystallizing magma ocean

Author

Geochemistry; Mars (Planet); Nakhlites; Planetary Evolution; Shergottites; Time Measurement; Radioactive Age Determination; Geochronology

20080009663 NASA Marshall Space Flight Center, Huntsville, AL, USA

Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns

Grugel, Richard N.; Toutanji, Houssam; January 2006; 1 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

Melting sulfur and mixing it with an aggregate to form 'concrete' is commercially well established and constitutes a material that is particularly well-suited for use in corrosive environments. Discovery of the mineral troilite (FeS) on the moon poses the question of extracting the sulfur for use as a lunar construction material. This would be an attractive alternative to conventional concrete as it does not require water. However, the viability of sulfur concrete in a lunar environment, which is characterized by lack of an atmosphere and extreme temperatures, is not well understood. Here it is assumed that the lunar ore can be mined, refined, and the raw sulfur melded with appropriate lunar regolith to form, for example, bricks. This study evaluates pure sulfur and two sets of small sulfur concrete samples that have been prepared using JSC-1 lunar stimulant and SiO₂ powder as aggregate additions. Each set was subjected to extended periods in a vacuum environment to evaluate sublimation issues. Results from these experiments are presented and discussed within the context of the lunar environment.

Author

Concretes; Lunar Environment; Lunar Rocks; Sublimation; Sulfur; Minerals

20080009702 NASA Marshall Space Flight Center, Huntsville, AL, USA

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation

Bray, Alleen; Hale, Joseph P.; April 02, 2006; 19 pp.; In English; 2006 Spring Sim/Simulation Interoperability Standards Organization and the Society for Modeling and Simulation International, 2-7 Apr. 2006, Huntsville, AL, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NAS8-02060; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009702>

Models and simulations (M&S) are critical resources in the exploration of space. They support program management, systems engineering, integration, analysis, test, and operations by providing critical information that supports key analyses and decisions (technical, cost and schedule). Consequently, there is a clear need to establish a solid understanding of M&S strengths and weaknesses, and the bounds within which they can credibly support decision making. In this presentation we will describe how development of simulation capability documentation will be used to form a Basis of Confidence (Basis of Confidence) for National Aeronautics and Space Administration (NASA) M&S. The process by which BOC documentation is developed will be addressed, as well as the structure and critical concepts that are essential for establishing credibility of NASA's Exploration Systems Mission Directorate (ESMD) legacy M&S. We will illustrate the significance of BOC documentation in supporting decision makers and Accreditation Authorities in M&S risk management.

Author

Simulation; Space Exploration; General Overviews; NASA Programs; Models

20080009711 NASA Johnson Space Center, Houston, TX, USA

GCR-Induced Photon Luminescence of the Moon

Lee, K. T.; Wilson, T. L.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

It is shown that the Moon has a ubiquitous photon luminescence induced by Galactic cosmic-rays (GCRs), using the Monte Carlo particle-physics program FLUKA. Both the fluence and the flux of the radiation can be determined by this method, but only the fluence will be presented here. This is in addition to thermal radiation emitted due to the Moon's internal temperature and radioactivity. This study is a follow-up to an earlier discussion [1] that addressed several misconceptions regarding Moonshine in the Earth-Moon system (Figure 1) and predicted this effect. There also exists a related x-ray fluorescence induced by solar energetic particles (SEPs, <350 MeV) and solar photons at lower x-ray energies, although this latter fluorescence was studied on Apollo 15 and 16 [2- 5], Lunar Prospector [6], and even EGRET [7].

Author

Galactic Cosmic Rays; Luminescence; Energetic Particles; Gamma Ray Observatory; Gamma Ray Telescopes; Radioactivity; Earth-Moon System; X Ray Fluorescence

20080009717 NASA Johnson Space Center, Houston, TX, USA

An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate

Schroder, C.; Di, K.; Morris, R. V.; Klingelhofer, G.; Li, R.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): DLR-50QM9902; Copyright; Avail.: CASI: [A01](#), Hardcopy

Home Plate is a light-toned plateau approx. 90 m in diameter within the Inner Basin of the Columbia Hills in Gusev crater on Mars. It is the most extensive exposure of layered bedrock encountered by Spirit to date, and it is composed of clastic rocks of moderately altered alkali basalt composition, enriched in some highly volatile elements. Textural observations suggest an explosive origin and geochemical observations favor volcanism, probably a hydrovolcanic explosion [1]. Since it first arrived at Home Plate on sol 744, Spirit has circumnavigated the plateau (Fig. 1) and is now, since sol 1410, resting at its Winter Haven 3 location at the north end of Home Plate. Results: The MER Moessbauer spectrometers determine Fe oxidation states, identify Fe-bearing mineral phases and quantify the distribution of Fe among oxidation states and mineral phases [2]. Moessbauer spectra of Home Plate bedrock were obtained in five different locations from nine different targets (Fig. 1): Barnhill Ace, Posey Manager, and James Cool Papa Bell Stars at the northwest side of Home Plate; Pesapallo, June Emerson, and Elizabeth Emery on the east side; Texas Chili on the south side; Pecan Pie on the west side; and Chanute on the north side.

Derived from text

Mineralogy; Mars Exploration; Moessbauer Effect; Sedimentary Rocks; Mars Craters; Volcanology; Geochemistry

20080009718 NASA Johnson Space Center, Houston, TX, USA

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts

Dobrea, E. Z. Noe; Bishop, J. L.; McKeown, N. K.; Swayze, G.; Michalski, J. R.; Poulet, F.; Bibring, J.-P.; Mustard, J. F.; Ehlmann, B. L.; Arvidson, R.; Morris, R. B.; Murchie, S.; McEwen, A. S.; Malaret, E.; Hash, C., et al.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

The largest exposure of phyllosilicates on Mars occurs on the highland plains around Mawrth Vallis. This exposure extends for about 300 km southward from the edge of the dichotomy boundary, covering an area greater than 200 x 300 kilometers over an elevation range of approximately 2000 meters. At least two different types of hydrated phyllosilicates (Fe/Mg-rich and Al-rich phyllosilicates) have been identified in OMEGA data based on absorption bands near 2.3 and 2.2 micrometers, respectively. These clay-bearing units are associated with layered, indurated light-toned units with complex spatial and stratigraphic relationships, and are unconformably overlain by a darker, indurated, more heavily cratered unit. Ongoing analysis of OMEGA (approximately 1 kilometer/pixel) and CRISM multi-spectral (MSP, 200 meters/pixel) data reveal hydrated minerals with absorptions at approximately 2.2 or 2.3 micrometers in locations up to 300 kilometers away from the borders of the previously identified extent of clay-bearing units. We seek to: 1) further constrain the mineralogy of the hydrated species identified in [5], and 2) understand spatial and stratigraphic relationships between the different hydrated minerals and the cratered plains units in which they are found. In this work we perform mineralogical and stratigraphic comparisons between units to test whether these extended units may be related, in order to establish a broad zone of alteration.

Derived from text

Clays; Stratigraphy; Mars Surface; Mineralogy; Silicates; Mars Volcanoes

20080009727 NASA Johnson Space Center, Houston, TX, USA

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature

Berthet, S.; Malavergne, V.; Righter, K.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The chondritic meteorites are materials that are as old as the solar system itself characterized by variations in bulk chemical and oxidation state, and have long been considered possible building blocks that accreted to form the terrestrial inner planets. Enstatite chondrites contain nearly FeO free enstatite, silicon-rich kamacite and various sulfides indicating formation under highly reducing conditions. These materials could have participated in the formation of the Earth. However, 'fingerprinting' of meteoritic materials has shown that no known meteoritic class corresponds to a hypothetical bulk Earth composition in every aspect. To derive constraints on early accretion and differentiation processes and possibly resolve the debate on the formation of the Earth, it is required to study experimentally a variety of chondritic materials and investigate their melting relations and elemental partitioning behavior at variable pressure (P), temperature (T) and oxygen fugacities (fO₂). Variations in fO₂ can indeed change chemical features and phase equilibria dramatically. The P-T phase diagrams of peridotites and carbonaceous chondrites have been extensively studied experimentally up to pressures and temperatures corresponding to the transition zone and lower mantle. Even though partial melting experiments have been conducted at ambient pressure on the enstatite chondrite Indarch, enstatite meteorites have never been experimentally investigated at high PT. The following investigation focuses on the effect of the fO₂ on the phase relations of Indarch, an EH4 chondrite.

Author

Carbonaceous Chondrites; Enstatite; High Temperature; Terrestrial Planets; Pressure; Mineralogy

20080009729 NASA Johnson Space Center, Houston, TX, USA

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation?

Righter, K.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080009729>

The origin of angrites has evaded scientists due in part to unusual mineralogy, oxidized character, and small numbers of samples. Increased interest in the origin of angrites has stemmed from the recovery of approximately 10 new angrites in the past decade. These new samples have allowed meteoriticists to recognize that angrites are compositionally diverse, old, and record very early differentiation. Also, a magma ocean has been proposed to have been involved in APB early differentiation, but this remains untested for siderophile elements which are commonly cited as one of the main lines of evidence for magma oceans on the early Earth, Moon, Mars and eucrite parent body (e.g., [6]). And recent suggestions that angrites may or may not be from Mercury have also peaked interest in these achondrites. Given all of this background, a detailed understanding of the early differentiation process is desired. Previous efforts at examining siderophile element (SE) concentrations with respect to core formation processes in the APB have not resulted in any definite conclusions regarding segregation of a metallic core. The goal of this study is to summarize what is known about SE concentrations in the suite, estimate depletions of SE compared to chondrites, and apply metal/silicate experimental partition coefficients to assess whether the APB had a core.

Derived from text

Siderophile Elements; Depletion; Earth Mantle; Mineralogy; Magma; Earth Core

20080009739 NASA Johnson Space Center, Houston, TX, USA

Current Issues in Human Spacecraft Thermal Control Technology

Ungar, Eugene K.; February 10, 2008; 1 pp.; In English; Space Technology and Applications International Forum, 10-14 Feb. 2008, Albuquerque, Mexico; No Copyright; Avail.: Other Sources; Abstract Only

Efficient thermal management of Earth-orbiting human spacecraft, lunar transit spacecraft and landers, as well as a lunar habitat will require advanced thermal technology. These future spacecraft will require more sophisticated thermal control systems that can dissipate or reject greater heat loads at higher input heat fluxes while using fewer of the limited spacecraft mass, volume and power resources. The thermal control designs also must accommodate the harsh environments associated with these missions including dust and high sink temperatures. The lunar environment presents several challenges to the design and operation of active thermal control systems. During the Apollo program, landings were located and timed to occur at lunar twilight, resulting in a benign thermal environment. The long duration polar lunar bases that are foreseen in 15 years will see extremely cold thermal environments. Long sojourns remote from low-Earth orbit will require lightweight, but robust and reliable systems. Innovative thermal management components and systems are needed to accomplish the rejection of heat from lunar bases. Advances are required in the general areas of radiators, thermal control loops and equipment. Radiators on the Moon's poles must operate and survive in very cold environments. Also, the dusty environment of an active lunar base may

require dust mitigation and removal techniques to maintain radiator performance over the long term.

Author

Temperature Control; Manned Spacecraft; Technology Utilization; Lunar Spacecraft; Control Systems Design

20080009755 NASA Langley Research Center, Hampton, VA, USA

Anomalistic Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation

Tolson, Robert H.; Willcockson, William H.; Desai, Prasun N.; Thomas, Paige; February 04, 2006; 20 pp.; In English; 29th Annual AAS Guidance and Control Conference, 4-8 Feb. 2006, Breckenridge, Co, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 23-978-10-10

Report No.(s): AAS 06-087; Copyright; Avail.: CASI: [A03](#), Hardcopy

Shortly after landing on Mars, post-flight analysis of the 'Spirit' entry data suggested that the vehicle experienced large, anomalistic oscillations in angle-of-attack starting at about $M=6$. Similar analysis for 'Opportunity' found even larger oscillations starting immediately after maximum dynamic pressure at $M=14$. Where angles-of-attack of 1-2 degrees were expected from maximum dynamic pressure to drogue deployment, the reconstructions suggested 4 to 9 degrees. The next Mars lander, 2007 Phoenix project, was concerned enough to recommend further exploration of the anomalies. Detailed analysis of 'Opportunity' data found significant anomalies in the hypersonic aerodynamic torques. The analysis showed that these torques were essentially fixed in the spinning vehicle. Nearly a year after landing, the 'Opportunity' rover took pictures of its aeroshell on the surface, which showed that portions of the aeroshell thermal blanket assembly still remained. This blanket assembly was supposed to burn off very early in the entry. An analysis of the aeroshell photographs led to an estimate of the aerodynamic torques that the remnants could have produced. A comparison of two estimates of the aerodynamic torque perturbations (one extracted from telemetry data and the other from Mars surface photographs) showed exceptional agreement. Trajectory simulations using a simple data derived torque perturbation model provided rigid body motions similar to that observed during the 'Opportunity' entry. Therefore, the case of the anomalistic attitude behavior for the 'Opportunity' EDL is now considered closed and a suggestion is put forth that a similar event occurred for the 'Spirit' entry as well.

Author

Anomalies; Mars Exploration; Torque; Telemetry; Mars Surface; Mars Roving Vehicles; Computational Fluid Dynamics; Entry

20080009774 NASA Johnson Space Center, Houston, TX, USA

Stereomicroscope Inspection of Polished Aluminum Collector 50684.0

Rodriguez, M. C.; Calaway, M. J.; Allton, J. H.; March 10, 2008; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains color illustrations

Contract(s)/Grant(s): NNNJ05H105C; Copyright; Avail.: CASI: [A01](#), Hardcopy

The Genesis polished aluminum 'kidney' collector was damaged during the hard landing of the capsule on September 8, 2004 in the Utah desert. The kidney was introduced into the Genesis (ISO class 4) cleanroom laboratory on November 4, 2004 and stored under nitrogen cover gas. The collector is currently fastened to a highly polished stainless steel plate for secure handling. Curatorial work at JSC has made successful subdivision and subsequent allocation of samples from the kidney.

Derived from text

Microscopes; Stereoscopy; Genesis Mission; Imaging Techniques

20080009785 NASA Johnson Space Center, Houston, TX, USA

Lunar Dust and Lunar Simulant Activation and Monitoring

Wallace, W. T.; Hammond, D. K.; Jeevarajan, A. S.; February 04, 2008; 1 pp.; In English; Human Research Program Investigators' Workshop, 4-6 Feb. 2008, League City, TX, USA; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Prior to returning to the moon, understanding the effects of lunar dust on both human physiology and mechanical equipment is a pressing concern, as problems related to lunar dust during the Apollo missions have been well documented (J.R. Gaier, The Effects of Lunar Dust on EVA Systems During the Apollo Missions. 2005, NASA-Glenn Research Center. p. 65). While efforts were made to remove the dust before reentering the lunar module, via brushing of the suits or vacuuming, a significant amount of dust was returned to the spacecraft, causing various problems. For instance, astronaut Harrison Schmitt complained of hay fever effects caused by the dust, and the abrasive nature of the material was found to cause problems with

various joints and seals of the spacecraft and suits. It is clear that, in order to avoid potential health and performance problems while on the lunar surface, the reactive properties of lunar dust must be quenched. It is likely that soil on the lunar surface is in an activated form, i.e. capable of producing oxygen-based radicals in a humidified air environment, due to constant exposure to meteorite impacts, UV radiation, and elements of the solar wind. An activated silica surface serves as a good example. An oxygen-based radical species arises from the breaking of Si-OSi bonds. This system is comparable to that expected for the lunar dust system due to the large amounts of agglutinic glass and silicate vapor deposits present in lunar soil. Unfortunately, exposure to the Earth's atmosphere has passivated the active species on lunar dust, leading to efforts to reactivate the dust in order to understand the true effects that will be experienced by astronauts and equipment on the moon. Electron spin resonance (ESR) spectroscopy is commonly used for the study of radical species, and has been used previously to study silicon- and oxygen-based radicals, as well as the hydroxyl radicals produced by these species in solution (V. Vallyathan, et al., *Am. Rev. Respir. Dis.* 138 (1988) 1213-1219). The size and cost of these instruments makes them unattractive for the monitoring of lunar dust activity. A more suitable technique is based on the change in fluorescence of a molecule upon reaction with a hydroxyl radical (or other radical species). Fluorescence instruments are much less costly and bulky than ESR spectrometers, and small fluorescence sensors for space missions have already been developed (F. Gao, et al., *J. Biomed. Opt.* 10 (2005) 054005). For the current fluorescence studies, the terephthalate molecule has been chosen for monitoring the production of hydroxyl radicals in solution. As shown in Scheme 1, the reaction between the non-fluorescent terephthalate molecule and a hydroxyl radical produces the highly-fluorescent 2-hydroxyterephthalate molecule.

Derived from text

Lunar Dust; Lunar Module; Surface Properties; Electron Paramagnetic Resonance; Extravehicular Activity

20080010672 NASA Johnson Space Center, Houston, TX, USA

NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview

Sanders, Gerald B.; Lason, William E.; Sacksteder, Kurt R.; Mclemore, Carole; Johnson, Kenneth; February 10, 2008; 29 pp.; In English; Space Technology Applications International Forum, 10-14 Feb. 2008, Albuquerque, NM, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): 083229.04.18.01.01; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010672>

Since the Vision for Space Exploration (VSE) was released in 2004, NASA, in conjunction with international space agencies, industry, and academia, has continued to define and refine plans for sustained and affordable robotic and human exploration of the Moon and beyond. With the goal of establishing a lunar Outpost on the Moon to extend human presence, pursue scientific activities, use the Moon to prepare for future human missions to Mars, and expand Earth's economic sphere, a change in how space exploration is performed is required. One area that opens up the possibility for the first time of breaking our reliance on Earth supplied consumables and learn to live off the land is In-Situ Resource Utilization (ISRU). ISRU, which involves the extraction and processing of space resources into useful products, can have a substantial impact on mission and architecture concepts. In particular, the ability to make propellants, life support consumables, and fuel cell reagents can significantly reduce the cost, mass, and risk of sustained human activities beyond Earth. However, ISRU is an unproven capability for human lunar exploration and can not be put in the critical path of lunar Outpost success until it has been proven. Therefore, ISRU development and deployment needs to take incremental steps toward the desired end state. To ensure ISRU capabilities are available for pre-Outpost and Outpost deployment by 2020, and mission and architecture planners are confident that ISRU can meet initial and long term mission requirements, the ISRU Project is developing technologies and systems in three critical areas: (1) Regolith Excavation, Handling and Material Transportation; (2) Oxygen Extraction from Regolith; and (3) Volatile Extraction and Resource Prospecting, and in four development stages: (I) Demonstrate feasibility; (II) Evolve system w/ improved technologies; (III) Develop one or more systems to TRL 6 before start of flight development; and (IV) Flight development for Outpost. To minimize cost and ensure that ISRU technologies, systems, and functions are integrated properly into the Outpost, technology development efforts are being coordinated with other development areas such as Surface Mobility, Surface Power, Life Support, EVA, and Propulsion. Lastly, laboratory and field system-level tests and demonstrations will be performed as often as possible to demonstrate improvements in: Capabilities (ex. digging deeper); Performance (ex. lower power); and Duration (ex. more autonomy or more robustness). This presentation will provide the status of work performed to date within the NASA ISRU project with respect to technology and system development and field demonstration activities, as well as the current strategy to implement ISRU in future robotic and human lunar exploration missions.

Author

Space Exploration; In Situ Resource Utilization; Technology Utilization; NASA Programs; General Overviews; Lunar Geology

20080010673 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA's M and S Accreditation Process Plan and Specification for Space Exploration

O'Neil, David; Hale, Joe; April 02, 2006; 45 pp.; In English; 2006 Spring Sim/Simulation Interoperability Standards Organization and The Society for Modeling and Simulation International, 2 Apr. - 7 Apr. 2006, Huntsville, AL, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NAS8-02060; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010673>

NASA's Exploration Systems Mission Directorate (ESMD) is implementing a management approach for modeling and simulation (M&S) that will provide decision-makers information on the model's fidelity, credibility, and quality. This information will allow the decision-maker to understand the risks involved in using a model's results in the decision-making process. This presentation will discuss NASA's overall approach to achieving formal accreditation of its models or simulations supporting space exploration. The development of a formal Accreditation Plan is a key component in the preliminary activities for modeling and simulation (M&S) assessment. This presentation will describe NASA's process for identifying risks associated with M&S use and the associated M&S assessments that will dictate the level of data certification and M&S verification and validation (V&V) activities required to support the decision-making process. The M&S Accreditation Plan and Report templates for ESMD will also be illustrated.

Author

Space Exploration; NASA Programs; Models; Simulation; Systems Integration; Specifications; Project Management

20080010713 NASA Johnson Space Center, Houston, TX, USA

In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions

Simon, Thomas M.; February 10, 2008; 19 pp.; In English; Space Technology and Applications International 2008, 10-14 Feb. 2008, Albuquerque, NM, USA; Original contains color illustrations

Contract(s)/Grant(s): ETDP 387498.01.10; No Copyright; Avail.: CASI: [A03](#), Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010713>

One of the ways that the Constellation Program can differ from Apollo is to employ a live-off-the-land or In-Situ Resource Utilization (ISRU) supported architecture. The options considered over the past decades for using indigenous materials have varied considerably in terms of what resources to attempt to acquire, how much to acquire, and what the motivations are to acquiring these resources. The latest NASA concepts for supporting the lunar outpost have considered many of these plans and compared these options to customers requirements and desires. Depending on the architecture employed, ISRU technologies can make a significant contribution towards a sustainable and affordable lunar outpost. While extensive ground testing will reduce some mission risk, one or more flight demonstrations prior to the first crew's arrival will build confidence and increase the chance that outpost architects will include ISRU as part of the early outpost architecture. This presentation includes some of the options for using ISRU that are under consideration for the lunar outpost, the precursor missions that would support these applications, and a notional timeline to allow the lessons learned from the precursor missions to support outpost hardware designs.

Author

Lunar Bases; In Situ Resource Utilization; Lunar Surface; Constellation Program; Space Missions

20080010733 NASA Johnson Space Center, Houston, TX, USA

Ancient Hydrothermal Springs in Arabia Terra, Mars

Oehler, Dorothy Z.; Allen, Carlton C.; [2008]; 2 pp.; In English; 39th Lunar and Planetary Science Conference, 10-14 Mar. 2008, League City, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

Hydrothermal springs are important astrobiological sites for several reasons: 1) On Earth, molecular phylogeny suggests that many of the most primitive organisms are hyperthermophiles, implying that life on this planet may have arisen in hydrothermal settings; 2) on Mars, similar settings would have supplied energy- and nutrient-rich waters in which early martian life may have evolved; 3) such regions on Mars would have constituted oases of continued habitability providing warm, liquid water to primitive life forms as the planet became colder and drier; and 4) mineralization associated with hydrothermal settings could have preserved biosignatures from those martian life forms. Accordingly, if life ever developed

on Mars, then hydrothermal spring deposits would be excellent localities in which to search for morphological or chemical remnants of that life. Previous attempts to identify martian spring deposits from orbit have been general or limited by resolution of available data. However, new satellite imagery from HiRISE has a resolution of 28 cm/pixel which allows detailed analysis of geologic structure and geomorphology. Based on these new data, we report several features in Vernal Crater, Arabia Terra that we interpret as ancient hydrothermal springs.

Derived from text

Exobiology; Mineral Deposits; Mars Surface; Hydrothermal Systems; Springs (Water); Planetary Geology; Geomorphology

20080010736 NASA Johnson Space Center, Houston, TX, USA

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions

Hoffman, Stephen J.; Voels, Stephen A.; Gerty, Christopher E.; February 11, 2008; 19 pp.; In English; STAIF 2008, 11-14 Feb. 2008, Albuquerque, NM, USA; Original contains color illustrations

Report No.(s): T502X; No Copyright; Avail.: CASI: A03, Hardcopy

ONLINE: <http://hdl.handle.net/2060/20080010736>

Vision: To create a cross-cutting Earth-based program to minimize cost and risk while maximizing the productivity of planetary exploration missions, by supporting precursor system development and carrying out system integration, testing, training, and public engagement as an integral part of the Vision for Space Exploration.

Derived from text

Analogs; Space Exploration; Systems Integration; Education; Constellation Program; Systems Engineering; Cost Reduction

20080010836 NASA Johnson Space Center, Houston, TX, USA

The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission

Carpenter, Amanda; Knight, Amanda; March 02, 2008; 2 pp.; In English; Earth and Space 2006 Conference, 2-5 Mar. 2008, Long Beach, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

In response to President Bush's 2004 Vision for Space Exploration initiative, NASA established an agency-wide Lunar Architecture Team (LAT) to develop the high-level requirements, assumptions, ground-rules and objectives for a manned mission to the moon. During Phase II of the evaluation, the Habitation Focus Element Group was directed to conceptually develop and design a Pressurized Logistics Module (PLM). The PLM task was delivered with one major requirement: to derive a system with minimal mass and cost, and a maximum, functional, internal volumetric area in order to provide the maximum amount of consumables, supportability and logistic re-supply for a crew of four to the Lunar surface with an overall integrated maximum weight of 5200kg. The PLM was derived from the Habitation Group's 'mini-Hab' option. This concept required that the PLM have an aluminum-clad graphite epoxy external truss, utilized for increased mobility and stability, which would encompass a 2.7 meter diameter pressurized aluminum-lithium cylinder. Several trade studies and analyses were performed to determine the final length and orientation of the module, the number of systems required to maintain the PLM, and the number of hatches/mating mechanisms which would successfully and efficiently meet the requirements. Of the five specific configurations assessed, the PLM was determined to have a 3 meter by 3 meter by 5 meter external truss with a 2.7 meter diameter and 5 meter long horizontal, pressurized cylinder with one hatch/mating mechanism on one end cone. Two major assumptions aided in the formulation of the technical baseline: 1) the PLM should be sustainable for up to 18 months on the Lunar Lander without connection to its final destination, the Lunar Outpost, and 2) it must be self-sufficient to withstand a maximum eight hour transit from the Lander to the Outpost. Per these assumptions, eight major systems constitute the PLM: structures, passive mating, protection, power, thermal, avionics, life support and outfitting. Including a conservative 20% growth, the overall estimated tare weight for the PLM was determined to be 2181kg. The tare weight of the design allowed the available internal volume of the cylinder with a 0.20 meter high floor to transport the maximum of either 176 single Crew Transfer Bags (CTBs) or 3019kg.

Author

Space Exploration; Life Support Systems; Habitats; Logistics; Lunar Surface; Lunar Bases

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*.

20080009783 NASA Johnson Space Center, Houston, TX, USA

Evaluations of Risks from the Lunar and Mars Radiation Environments

Kim, Myung-Hee; Hayat, Matthew J.; Feiveson, Alan H.; Cucinotta, Francis A.; [2008]; 1 pp.; In English; Asia and Oceania Geosciences Society 2008, Busan, Korea, Republic of; Copyright; Avail.: CASI: [A01](#), Hardcopy

Protecting astronauts from the space radiation environments requires accurate projections of radiation in future space missions. Characterization of the ionizing radiation environment is challenging because the interplanetary plasma and radiation fields are modulated by solar disturbances and the radiation doses received by astronauts in interplanetary space are likewise influenced. The galactic cosmic radiation (GCR) flux for the next solar cycle was estimated as a function of interplanetary deceleration potential, which has been derived from GCR flux and Climax neutron monitor rate measurements over the last 4 decades. For the chaotic nature of solar particle event (SPE) occurrence, the mean frequency of SPE at any given proton fluence threshold during a defined mission duration was obtained from a Poisson process model using proton fluence measurements of SPEs during the past 5 solar cycles (19-23). Analytic energy spectra of 34 historically large SPEs were constructed over broad energy ranges extending to GeV. Using an integrated space radiation model (which includes the transport codes HZETRN [1] and BRYNTRN [2], and the quantum nuclear interaction model QMSFRG[3]), the propagation and interaction properties of the energetic nucleons through various media were predicted. Risk assessment from GCR and SPE was evaluated at the specific organs inside a typical spacecraft using CAM [4] model. The representative risk level at each event size and their standard deviation were obtained from the analysis of 34 SPEs. Risks from different event sizes and their frequency of occurrences in a specified mission period were evaluated for the concern of acute health effects especially during extra-vehicular activities (EVA). The results will be useful for the development of an integrated strategy of optimizing radiation protection on the lunar and Mars missions. Keywords: Space Radiation Environments; Galactic Cosmic Radiation; Solar Particle Event; Radiation Risk; Risk Analysis; Radiation Protection.

Author

Lunar Radiation; Radiation Protection; Risk; Solar Corpuscular Radiation; Ionizing Radiation; Mars Environment; Plasma Radiation; Galactic Radiation

20080010849 NASA Johnson Space Center, Houston, TX, USA

Science Goals in Radiation Protection for Exploration

Cucinotta, Francis A.; February 26, 2008; 1 pp.; In English; 3rd Space Exploration Conference '50 Years of Space', 26-28 Feb. 2008, Denver, Co, USA; No Copyright; Avail.: Other Sources; Abstract Only

Space radiation presents major challenges to future missions to the Earth's moon or Mars. Health risks of concern include cancer, degenerative and performance risks to the central nervous system, heart and lens, and the acute radiation syndromes. The galactic cosmic rays (GCR) contain high energy and charge (HZE) nuclei, which have been shown to cause qualitatively distinct biological damage compared to terrestrial radiation, such as X-rays or gamma-rays, causing risk estimates to be highly uncertain. The biological effects of solar particle events (SPE) are similar to terrestrial radiation except for their biological dose-rate modifiers; however the onset and size of SPEs are difficult to predict. The high energies of GCR reduce the effectiveness of shielding, while SPEs can be shielded however the current gap in radiobiological knowledge hinders optimization. Methods used to project risks on Earth must be modified because of the large uncertainties in projecting health risks from space radiation, and thus impact mission requirements and costs. We describe NASA's unique approach to radiation safety that applies probabilistic risk assessments and uncertainty based criteria within the occupational health program for astronauts and to mission design. The two terrestrial criteria of a point estimate of maximum acceptable level of risk and application of the principle of As Low As Reasonably Achievable (ALARA) are supplemented by a third requirement that protects against risk projection uncertainties using the upper 95% confidence level (CL) in radiation risk projection models. Exploration science goals in radiation protection are centered on ground-based research to achieve the necessary biological knowledge, and in the development of new technologies to improve SPE monitoring and optimize shielding. Radiobiology research is centered on a ground based program investigating the radiobiology of high-energy protons and HZE nuclei at the NASA Space Radiation Laboratory (NSRL) located at DoE's Brookhaven National Laboratory in Upton, NY. We describe recent NSRL results that are closing the knowledge gap in HZE radiobiology and improving exploration risk estimates. Linking probabilistic risk assessment to research goals makes it possible to express risk management objectives in terms of

quantitative metrics, which include the number of days in space without exceeding a given risk level within well defined confidence limits, and probabilistic assessments of the effectiveness of design trade spaces such as material type, mass, solar cycle, crew selection criteria, and biological countermeasures. New research in SPE alert and risk assessment, individual radiation sensitivity, and biological countermeasure development are described.

Author

Radiation Protection; Space Exploration; Health Physics; Radiobiology; Extraterrestrial Radiation

99

GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

20080010679 American Inst. of Aeronautics and Astronautics, Reston, VA, USA

Sputnik and the Dawn of the Space Age

Harford, James; Aerospace America; October 2007; ISSN 0740-722X; Volume 45, No. 10, pp. 30-36; In English; Original contains poor quality, truncated or crooked pages; Copyright; Avail.: Other Sources

A review of the launch of Sputnik I, the preliminary planning, the political meanings, and the international reverberations of the Soviet Sputnik launch is presented. Included in this is the backdrop of the competition of the Cold War, and the military programs.

CASI

Launching; Sputnik Satellites; Histories

Subject Term Index

ABERRATION

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

ABSTRACTS

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180

Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts) – 29

AC GENERATORS

Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68

ACCELERATORS

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75

ACCESS CONTROL

Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39

ACCUMULATORS

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

ACCURACY

Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 39

Verification of Software: The Textbook and Real Problems – 156

ACHONDRITES

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

ACOUSTIC MEASUREMENT

Spacecraft Internal Acoustic Environment Modeling – 172

ACOUSTICS

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28

Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172

Spacecraft Internal Acoustic Environment Modeling – 172

ACTIVE CONTROL

Time Delay H(infinity) Control of Structures Under Earthquake Loading – 45

ACTUATORS

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 67

Network device interface for digitally interfacing data channels to a controller via a network – 160

Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2

ADAPTATION

A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models – 158

ADAPTIVE CONTROL

Data-Driven Robust Control Design: Unfalsified Control – 151

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots – 163

ADAPTIVE FILTERS

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

ADAPTIVE OPTICS

Thin, nearly wireless adaptive optical device – 69

ADDITIVES

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

ADRIATIC SEA

Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003 – 87

AERODYNAMIC STABILITY

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

AERODYNAMICS

Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69

AEROELASTICITY

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

Modeling and Optimization for Morphing Wing Concept Generation II – 6

Physics-Based Aeroelastic Analysis for Future Air Vehicle Concepts Using a Fully Nonlinear Methodology – 7

AEROGELS

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

AERONAUTICS

Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 2

AEROSPACE ENGINEERING

Data-Driven Robust Control Design: Unfalsified Control – 151

Ion Focusing Improves Hall-Effect Thruster – 65

Space Industry – 16

AEROSPACE ENVIRONMENTS

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185

Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19

AEROSPACE MEDICINE

A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110

Analysis and Comparative Study on Characteristics of Competent Astronauts – 117

Changes in Calcium Metabolism during Space Flight – 122

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

- Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Human Research Program Requirements Document – 115
- Incidence of Latent Virus Shedding during Space Flight – 111
- International Space Station Medical Operations – 122
- International Space Station Medical Project – 113
- Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121
- Mission Medical Information System – 115
- Neuroscience in Space – 123
- Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Space Radiation Program Element – 113
- Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Validation of Procedures for Monitoring Crewmember Immune Function – 109
- AEROSPACE SYSTEMS**
- Human Factors Engineering Standards at NASA – 148
- Space Industry – 16
- AEROSPACE VEHICLES**
- Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- AFRICA**
- Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96
- Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92
- AIR FLOW**
- Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47
- AIR QUALITY**
- Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47
- STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18
- AIR TRAFFIC CONTROL**
- Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 2
- Application of Knowledge-Based Techniques to Tracking Function – 54
- Information Complexity in Air Traffic Control Displays – 182
- Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5
- Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4
- AIR TRANSPORTATION**
- The Aircraft Industry, 2006 – 10
- AIR WATER INTERACTIONS**
- A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30
- AIRBORNE EQUIPMENT**
- Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- AIRBORNE RADAR**
- Application of Knowledge-Based Techniques to Tracking Function – 54
- Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52
- AIRCRAFT ACCIDENTS**
- Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- AIRCRAFT ANTENNAS**
- Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68
- AIRCRAFT COMMUNICATION**
- Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 2
- AIRCRAFT CONTROL**
- Method and apparatus for loss of control inhibitor systems – 11
- AIRCRAFT DESIGN**
- Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12
- Modeling and Optimization for Morphing Wing Concept Generation II – 6
- AIRCRAFT ENGINES**
- Bootstrap data methodology for sequential hybrid model building – 12
- Method and apparatus for in-situ detection and isolation of aircraft engine faults – 76
- AIRCRAFT EQUIPMENT**
- Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10
- AIRCRAFT INSTRUMENTS**
- Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4
- AIRCRAFT MAINTENANCE**
- An International Survey of Maintenance Human Factors Programs – 8
- AIRCRAFT MODELS**
- Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- AIRCRAFT PILOTS**
- Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- AIRCRAFT SAFETY**
- Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5
- AIRCRAFT**
- Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- AIRFOIL PROFILES**
- Modeling and Optimization for Morphing Wing Concept Generation II – 6
- Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- AIRFOILS**
- Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32
- Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- AIRPORTS**
- Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13
- ALGORITHMS**
- A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
- A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

- An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105
- An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152
- Knowledge-Based Control for Space Time Adaptive Processing – 52
- Low Complexity Convolutional Codes of Rate 2/N – 38
- ALIGNMENT**
- Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- Increased alignment in carbon nanotube growth – 61
- ALLUVIUM**
- The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 49
- ALPHA PARTICLES**
- Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 85
- The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- ALTITUDE ACCLIMATIZATION**
- Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90
- ALUMINUM ALLOYS**
- A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33
- Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- ALUMINUM ISOTOPES**
- Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- AMINES**
- Catalytic dehydrogenation of amine borane complexes – 27
- AMMONIA**
- Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44
- AMORPHOUS MATERIALS**
- The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- ANALOGIES**
- A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
- ANALOGS**
- Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196
- Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
- ANESTHESIA**
- Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90
- ANIMALS**
- Marine Mammals and Active Sonar – 172
- ANNUAL VARIATIONS**
- Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- ANOMALIES**
- Anomalistic Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
- ANTENNA ARRAYS**
- Impact of Knowledge-Based Techniques on Emerging Technologies – 52
- Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68
- ANTENNAS**
- Proceedings of the 2007 Antenna Applications Symposium, Volume 2 – 68
- ANTHROPOMETRY**
- Applications of Human Factors in Space – 147
- Derivation of Boundary Manikins: A Principal Component Analysis – 146
- Population Analysis: Communicating in Context – 147
- ANTIBIOTICS**
- Effects of Psoralen on ADR Multidrug Resistance and Ca2(+) Concentration in MCF-7/ADR Cells – 117
- ANTIBODIES**
- Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100
- Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98
- ANTIEMETICS AND ANTINAUSEANTS**
- Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4
- ANTIGENS**
- Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96
- ANTISUBMARINE WARFARE**
- An Operator Perspective on Net-Centric Underwater Warfare – 50
- ANXIETY**
- Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133
- APOPTOSIS**
- Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- APPLICATIONS PROGRAMS (COMPUTERS)**
- JBoss Middleware for Spacecraft Trajectory Operations – 160
- NASA Constellation Distributed Simulation Middleware Trade Study – 161
- AQUEOUS SOLUTIONS**
- Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45
- Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44
- ARCHITECTURE (COMPUTERS)**
- A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152
- A Toolkit for Building Hybrid, Multi-Resolution PMESII Models – 158
- NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154
- Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149
- SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- ARES 1 LAUNCH VEHICLE**
- The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 16
- ARMED FORCES (UNITED STATES)**
- Environmental Assessment Golf Learning Center and Driving Range – 77
- ARMED FORCES**
- Basic and Operational Doctrine for Airpower in Irregular Warfare – 18

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129

Early Interventions after Critical Incidents - Application – 138

Family Support in the German Armed Forces – 139

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136

Measuring Morale within the French Army – 125

Military Leader's Role in Psychological Support during Deployment – 137

Morale as a Protection Factor against Mission Related Stress – 135

My Father is a Soldier - A Children's Book – 133

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 98

Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport – 141

Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130

Risk, Psychiatry and the Modern Military – 132

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129

ARRAYS

Nanoengineered thermal materials based on carbon nanotube array composites – 63

ARTERIES

Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106

ARTIFICIAL INTELLIGENCE

Expert System Constant False Alarm Rate (CFAR) Processor – 53

Fundamentals of Knowledge-Based Techniques – 54

Introduction to Radar Signal and Data Processing: The Opportunity – 51

Tracking of cells with a compact microscope imaging system with intelligent controls – 69

ARTIFICIAL SATELLITES

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

Project VANGUARD Report No. 2, Report of Progress – 14

ASIA

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

ASSAYING

Effects of Psoralen on ADR Multidrug Resistance and Ca2(+) Concentration in MCF-7/ADR Cells – 117

ASSIMILATION

Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163

ASTEROIDS

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

ASTRONAUT LOCOMOTION

The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

ASTRONAUT PERFORMANCE

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120

ASTRONAUT TRAINING

Human Factors in Training – 110

ASTRONAUTS

Analysis and Comparative Study on Characteristics of Competent Astronauts – 117

Applications of Human Factors in Space – 147

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

Foot Reaction Forces during Long Duration Space Flight – 109

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112

Shuttle to Orion: First Steps Back to Orbit – 18

Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

ASYMPTOTES

Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2

ATLANTIC OCEAN

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88

ATMOSPHERIC DENSITY

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185

ATMOSPHERIC EFFECTS

TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161

ATMOSPHERIC RADIATION

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

ATMOSPHERIC TEMPERATURE

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78

ATMOSPHERICS

Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 29

TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161

ATOMIC STRUCTURE

Are Fullerenes Relevant to Cosmochemistry? A New Finding – 179

ATOMS

Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174

ATTITUDE (INCLINATION)

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

AUGMENTATION

Layered Augmented Virtuality – 165

AUTOCORRELATION

Monitoring on Depth of Anesthesia Basing on a Rhythm Autocorrelation of EEG Signals – 90

AUTOMATIC PILOTS

Autonomous Formation Flight: Project Overview – 1

AUTONOMOUS NAVIGATION

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

AUTONOMY

A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

Autonomous Formation Flight: Project Overview – 1

Layered Augmented Virtuality – 165

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42

AUTOROTATION

Atmospheric autorotating imaging device – 70

AVIATION PSYCHOLOGY

Early Interventions after Critical Incidents - Application – 139

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4

AVIONICS

Test and Verification Approach for the NASA Constellation Program – 12

AXIAL LOADS

A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37

AXIAL STRAIN

Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120

BACKSCATTERING

Polarimetric Interferometry - Target Detection Applications – 55

BALANCE

Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146

BALANCING

Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107

BALL BEARINGS

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75

BANDWIDTH

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44

BASALT

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite MIL03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83

The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84

BATTERY CHARGERS

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 48

BAYES THEOREM

Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer – 167

BEAMFORMING

Information Theoretic Radar Waveform Design for Multiple Targets – 165

Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68

BED REST

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121

BERNOULLI THEOREM

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

BIBLIOGRAPHIES

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180

BIMETALS

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44

BINOCULAR VISION

A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 117

BIOASTRONAUTICS

Neuroscience in Space – 123

Space Radiation Program Element – 113

BIODEGRADABILITY

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

BIODYNAMICS

Applications of Human Factors in Space – 147

Population Analysis: Communicating in Context – 147

Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116

Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106

BIOELECTRIC POTENTIAL

A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 117

BIOENGINEERING

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 149

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107

Relationship between Surface EMG and Angle of Elbow Joint – 108

BIOINSTRUMENTATION

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

BIOLOGICAL EFFECTS

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

BIOLOGICAL WEAPONS

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Major Biological Threat Agents – 99

BIOLOGY

Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104

BIOMARKERS

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

BIOMIMETICS

Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – 96

BIOTECHNOLOGY

Biotechnology Industry, 2006 – 145

BISTATIC REFLECTIVITY

Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172

BLOCKING

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100

BLOOD FLOW

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

BLOOD PLASMA

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

BLOOD PRESSURE

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

BLOOD VESSELS

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121

BLOOD

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 175

BODY-WING CONFIGURATIONS

Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6

BONDING

Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 76

BONE MARROW

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 103

Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120

BONES

Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 119

BORANES

Catalytic dehydrogenation of amine borane complexes – 27

BOUNDARY CONDITIONS

Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

BOUNDARY ELEMENT METHOD

Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117

BRAIN CIRCULATION

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

BRAIN

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

BREAST

Evaluation of *Listeria Monocytogenes* Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96

Genomic Instability and Breast Cancer – 97

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 97

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis – 99

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101

Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98

BRECCIA

Meteorite Dunitite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

BRIDGES (STRUCTURES)

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

BRIDGES

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

BRITTLENESS

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34

BROADBAND

A Novel Detector of Broadband Transient Signals – 73

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44

BROADCASTING

News Media Industry – 181

BUILDINGS

Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003 – 40

BURNING RATE

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

C BAND

Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72

CABLES

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 67

CALCIFICATION

Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120

CALCIUM METABOLISM

Changes in Calcium Metabolism during Space Flight – 122

CALCIUM PHOSPHATES

Acid Vapor Weathering of Apatite and Implications for Mars – 86

CALIBRATING

Normal and Differential SAR Interferometry – 58

Present and Future Airborne and Spaceborne Systems – 59

CALORIMETERS

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

CAMERAS

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 97

CANADA

RAP Simulation Environment Characteristics – 154

CANCER

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100

Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118

Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer – 100

Evaluation of *Listeria Monocytogenes* Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96

Genomic Instability and Breast Cancer – 97

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92

Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108

Molecular and Clinical Predictors of Aggressive Prostate Cancer – 91

New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling – 100

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – 96

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101

Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled SiRNA-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98

CANNULAE

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

CAPSULES

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24

Process for Self-Repair of Insulation Material – 25

Process for self-repair of insulation material – 33

CARBON DIOXIDE

Kinetics of Reaction between LiOH - H₂O and CO₂ – 120

CARBON FIBERS

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

CARBON NANOTUBES

Are Fullerenes Relevant to Cosmochemistry? A New Finding – 179

Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25

Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62

Functionalization of carbon nanotubes – 62

Functionalization of Carbon Nanotubes – 176

Increased alignment in carbon nanotube growth – 61

Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – 25

Nanoengineered thermal materials based on carbon nanotube array composites – 63

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 29

CARBONACEOUS CHONDRITES

Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192

N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187

CARBONACEOUS MATERIALS

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

CARBONACEOUS METEORITES

Are Fullerenes Relevant to Cosmochemistry? A New Finding – 179

CARBONIZATION

Kinetics of Reaction between LiOH - H₂O and CO₂ – 120

CARDIOVASCULAR SYSTEM

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121

Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115

CARGO

Cargo Integration Products for External Release – 14

CATALYSTS

Catalytic dehydrogenation of amine borane complexes – 27

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

CATHODES

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

CELLS (BIOLOGY)

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113

Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121

Tracking of cells with a compact microscope imaging system with intelligent controls – 69

CENTRAL NERVOUS SYSTEM

Neuroscience in Space – 123

CERAMICS

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34

CEREBRUM

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

CHANNELS (DATA TRANSMISSION)

Network device interface for digitally interfacing data channels to a controller via a network – 161

CHAOS

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180

CHARACTERISTICS

Analysis and Comparative Study on Characteristics of Competent Astronauts – 117

CHEMICAL ANALYSIS

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42

CHEMICAL CLEANING

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

CHEMICAL COMPOSITION

Functionalization of carbon nanotubes – 63

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84

CHEMICAL ENGINEERING

Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174

CHEMICAL REACTIONS

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 108

CHEMICAL WARFARE

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

CHILDREN

My Father is a Soldier - A Children's Book – 133

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

CHOLINESTERASE

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

CHONDRITES

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

CHROMOSOMES

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

CIRCADIAN RHYTHMS

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105

CIVIL AVIATION

Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4

CLASSIFICATIONS

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

CLAYS

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191

CLIMATE

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

CLINICAL MEDICINE

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

International Space Station Medical Operations – 122

Mission Medical Information System – 115

CLONING (BIOLOGY)

Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90

CLOSED ECOLOGICAL SYSTEMS

Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148

CLUSTER ANALYSIS

Data Mining SIAM Presentation – 162

CLUTTER

Heuristic Automation for Decluttering Tactical Displays – 66

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

Polarimetric Detection of Targets in Inhomogeneous Clutter – 72

Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71

Sea Clutter Generation and Target Detection – 171

Waveform-Agile Tracking In Heavy Sea Clutter – 72

COASTS

Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163

Coastal Sediment Transport Models and Mixed Particle Size Dynamics – 164

COATINGS

Comparative Packaging Study – 36

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31

Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers – 67

Increased alignment in carbon nanotube growth – 61

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24

CODING

Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46

COERCIVITY

Coercive Airpower in the Twenty First Century – 3

COGNITION

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42

COHERENT RADAR

Polarimetric Interferometry - Target Detection Applications – 55

COHERENT SCATTERING

Polarimetric Interferometry - Remote Sensing Applications – 58

Polarimetric Interferometry – 56

COHESION

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 138

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

COLD ROLLING

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31

COLD TOLERANCE

Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95

COLD WATER

Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95

COLLAGENS

Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120

COLLISIONS

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 28

COLONIES

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 103

COLOR

Universal Share for the Sharing of Multiple Images – 40

COMBAT

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

Battlemind Training: Building Soldier Resiliency – 138

Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132

Leader Actions to Enhance Soldier Resiliency in Combat – 140

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

The Mental Health Needs Assessment – 126

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

Virtual Reality as a Tool in Early Interventions – 128

COMBUSTION CHAMBERS

Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26

COMET NUCLEI

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

Curation of Frozen Samples – 184

COMETS

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187

Three-Dimensional Shapes and Impact Size Estimation of Stardust Impact – 188

COMMAND AND CONTROL

Assessing the Adequacy of Coverage of Joint Command and Control in the Capstone Concept for Joint Operations – 50

Close Air Support Command and Control at the Operational Level – 50

COMMERCIAL AIRCRAFT

The Aircraft Industry, 2006 – 10

COMMERCIAL OFF-THE-SHELF PRODUCTS

Spacecraft Internal Acoustic Environment Modeling – 172

COMMUNICATING

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

COMMUNICATION NETWORKS

Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 2

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185

Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5

Wireless Cooperative Networks: Self-Configuration and Optimization – 66

COMPATIBILITY

Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4

COMPETITION

Electronics Industry – 65

COMPLEX SYSTEMS

Advanced Control Law Tuning and Performance Assessment – 152

An Optimization Model of Sewage Rehabilitation – 37

Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12

COMPLEXITY

Low Complexity Convolutional Codes of Rate 2/N – 38

COMPOSITE MATERIALS

A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37

Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – 25

Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32

Process for Self-Repair of Insulation Material – 25

Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108

COMPOSITION (PROPERTY)

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

COMPRESSIBILITY

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24

COMPRESSING

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

COMPRESSION LOADS

Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116

COMPRESSION TESTS

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

COMPUTATIONAL FLUID DYNAMICS

Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193

Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9

COMPUTATION

The 2009 Version of the Aeroprediction Code: The AP09 – 2

COMPUTER AIDED DESIGN

Augmented Reality for Maintenance and Repair (ARMAR) – 160

Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46

COMPUTER GRAPHICS

Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 10

COMPUTER INFORMATION SECURITY

SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153

COMPUTER NETWORKS

A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

Network device interface for digitally interfacing data channels to a controller via a network – 160

COMPUTER PROGRAMMING

Capability Maturity Model (Trademark) Integration (CMMI (Service Mark)), Version 1.1. CMMI (Service Mark) for Software Engineering (CMMI-SW, V1.1) – 156

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153

Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46

COMPUTER PROGRAMS

Capability Maturity Model (Trademark) Integration (CMMI (Service Mark)), Version 1.1. CMMI (Service Mark) for Software Engineering (CMMI-SW, V1.1) – 156

Review of Collaborative Tools for Planning and Engineering – 159

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

Verification of Software: The Textbook and Real Problems – 156

COMPUTER SYSTEMS DESIGN

Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39

COMPUTER VISION

Tracking of cells with a compact microscope imaging system with intelligent controls – 70

COMPUTERIZED SIMULATION

AIMSsim Version 2.2.1, User Manual – 157

Gun Control for VBE-E: User Guide and Technical Description – 159

Herc SAR Task 106: AIMS Feature Development – 156

Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 47

Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158

RAP Simulation Environment Characteristics – 153

Review of Collaborative Tools for Planning and Engineering – 159

U.S. GODALE: Global Ocean Prediction With the HYbrid Coordinate Ocean Model – 163

CONCENTRATORS

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbide Target 60001 – 184

CONCRETES

A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190

CONDUCTIVE HEAT TRANSFER

Nanoengineered thermal materials based on carbon nanotube array composites – 63

CONDUCTORS

Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62

CONFERENCES

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180

Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts) – 29

Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68

Proceedings of the 2007 Antenna Applications Symposium. Volume 2 – 68

CONFIDENCE LIMITS

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

CONFIGURATIONS

The 2009 Version of the Aeroprediction Code: The AP09 – 2

CONICAL BODIES

Three-Dimensional Propagation and Scattering Around a Conical Sea-mount – 166

CONJUGATION

High Mobility Conjugated Polymers – 34

CONSTELLATION PROGRAM

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196

In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – 195

NASA Constellation Distributed Simulation Middleware Trade Study – 161

Shuttle to Orion: First Steps Back to Orbit – 18

Test and Verification Approach for the NASA Constellation Program – 11

CONSTRUCTION

Environmental Assessment Golf Learning Center and Driving Range – 77

CONSUMABLES (SPACECREW SUPPLIES)

Thermostable Shelf Life Study – 103

CONTAINERLESS MELTS

Containerless Processing of a Lithium Disilicate Glass – 24

CONTAMINANTS

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81

CONTAMINATION

Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 105

CONTINENTAL SHELVES

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172

CONTINGENCY

A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110

CONTROL EQUIPMENT

Information Presentation – 146

Method and apparatus for loss of control inhibitor systems – 11

CONTROL SYSTEMS DESIGN

Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152

Current Issues in Human Spacecraft Thermal Control Technology – 192

Embedded Control System Design and Practice: An Example by a FCU Controller – 45

Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162

Time Delay H(infinity) Control of Structures under Earthquake Loading – 44

Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls – 63

CONTROL THEORY

Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II – 150

Advanced Control Law Tuning and Performance Assessment – 151

Control Theory Perspective of Effects-Based Thinking and Operations: Modeling 'Operations' as a Feedback Control System – 169

Data-Driven Robust Control Design: Unfalsified Control – 151

- Quantitative Robust Control Engineering: Theory and Applications – 151
- CONTROLLERS**
- A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44
- Data-Driven Robust Control Design: Unfalsified Control – 151
- Embedded Control System Design and Practice: An Example by a FCU Controller – 45
- Network device interface for digitally interfacing data channels to a controller via a network – 160
- Quantitative Robust Control Engineering: Theory and Applications – 151
- CONTROL**
- Control Theory Perspective of Effects-Based Thinking and Operations: Modelling ‘Operations’ as a Feedback Control System – 170
- CONVECTION**
- Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- CONVERGENCE**
- Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- Verification of Software: The Textbook and Real Problems – 156
- CONVOLUTION INTEGRALS**
- Low Complexity Convolutional Codes of Rate 2/N – 38
- COPPER**
- Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74
- CORES**
- Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- CORONARY ARTERY DISEASE**
- Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91
- CORONARY CIRCULATION**
- Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and ‘Braslet-M’ Occlusion Cuffs – 115
- CORRELATION**
- A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 117
- CORROSION PREVENTION**
- Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31
- Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- CORROSION**
- Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- COSMIC RAY SHOWERS**
- 3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71
- COSMOCHEMISTRY**
- Are Fullerenes Relevant to Cosmochemistry? A New Finding – 179
- COST REDUCTION**
- Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196
- COUNTERMEASURES**
- Foot Reaction Forces during Long Duration Space Flight – 109
- Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121
- Neuroscience in Space – 123
- COUPLED MODES**
- Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166
- CRACK PROPAGATION**
- Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26
- CRATERING**
- The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- CRATERS**
- Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 85
- CREEP PROPERTIES**
- Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- CREEP STRENGTH**
- Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32
- CREW EXPLORATION VEHICLE**
- The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 16
- CREW SIZE**
- Human Space Flight – 186
- CRITICAL LOADING**
- Early Interventions after Critical Incidents - Application – 139
- CRITICAL VELOCITY**
- Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- CROSS CORRELATION**
- An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- CROWDING**
- Two Crowd Control Case Studies – 170
- CRUSTS**
- K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83
- Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85
- Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80
- CRYOGENIC TEMPERATURE**
- High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- CRYOGENICS**
- High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- CRYPTOGRAPHY**
- Universal Share for the Sharing of Multiple Images – 40
- CRYSTAL GROWTH**
- Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- CRYSTAL STRUCTURE**
- Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Structure and Mechanism-Based Design of ErbB Receptor Inhibitors – 98
- CRYSTALLINITY**
- Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- CRYSTALLIZATION**
- In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 25
- CULTIVATION**
- Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- CURRENT DENSITY**
- Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117
- CUSHIONS**
- Cushion system for multi-use child safety seat – 37
- Cushion System for Multi-Use Child Safety Seat – 74

CYCLONES

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87

CYTOLOGY

Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104

DAMAGE

Genomic Instability and Breast Cancer – 97

DATA ACQUISITION

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179

Life Sciences Data Archive (LSDA) – 103

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

DATA BASES

Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40

Life Sciences Data Archive (LSDA) – 103

DATA LINKS

Network device interface for digitally interfacing data channels to a controller via a network – 161

DATA MANAGEMENT

Fuselet Workflow Inspection and Feedback – 183

Life Sciences Data Archive (LSDA) – 103

DATA MINING

Data Mining and Homeland Security: An Overview – 179

Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179

Data Mining SIAM Presentation – 161

DATA PROCESSING

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

Information Complexity in Air Traffic Control Displays – 182

Introduction to Radar Signal and Data Processing: The Opportunity – 51

Knowledge-Based Control for Space Time Adaptive Processing – 52

Knowledge-Based Radar Signal and Data Processing – 50

Survey of Event Processing – 183

DATA SYSTEMS

Knowledge-Based Control for Space Time Adaptive Processing – 53

DC 8 AIRCRAFT

Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88

DECISION MAKING

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42

DECOMPOSITION

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45

Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

DECONTAMINATION

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81

DEFORMATION

Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003 – 40

Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48

DEGRADATION

A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40

Normal and Differential SAR Interferometry – 58

DEHYDRATION

Kinetics of Reaction between LiOH - H₂O and CO₂ – 120

DEHYDROGENATION

Catalytic dehydrogenation of amine borane complexes – 27

DELIVERY

Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158

DENSITY (MASS/VOLUME)

Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32

DEOXYRIBONUCLEIC ACID

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100

Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104

Genomic Instability and Breast Cancer – 97

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101

DEPLETION

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192

DEPLOYMENT

A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

Battlemind Training: Building Soldier Resiliency – 138

Commander - Unit Psychologist: A Powerful Tandem – 137

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131

Deployment Support - Strength through Partnership – 138

Enhancing Mental Readiness in Military Personnel – 131

French Army - Family Psychological and Social Support – 144

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136

Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134

Military Leader Perspectives of Psychological Fitness – 129

Military Leader's Role in Psychological Support during Deployment – 137

My Father is a Soldier - A Children's Book – 133

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137

Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

DEPOSITION

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63

DEPTH

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

DESIGN ANALYSIS

Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003 – 40

Early Design Choices: Capture, Model, Integrate, Analyze, Simulate – 171

LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 47

DETECTION

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71

Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62

Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 175

Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179

Interband cascade detectors – 176

Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174

MURI Center for Multidimensional Surface-Enhanced Sensing and Spectroscopy – 173

Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems – 7

Polarimetric Detection of Targets in Inhomogeneous Clutter – 72

Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71

Sea Clutter Generation and Target Detection – 171

Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106

The Role of Frame Force in Quantum Detection – 167

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

DETECTORS

A Novel Detector of Broadband Transient Signals – 73

DETERIORATION

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

DETONATION

Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31

DEUTERIUM

Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28

DIABETES MELLITUS

Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 176

DIAGNOSIS

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

DIELECTRICS

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63

DIFFERENTIAL EQUATIONS

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

DIFFERENTIAL INTERFEROMETRY

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Normal and Differential SAR Interferometry – 58

Polarimetric Interferometry - Target Detection Applications – 55

Polarimetric Interferometry – 56

Present and Future Airborne and Spaceborne Systems – 59

DIGITAL ELEVATION MODELS

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

DIGITAL SYSTEMS

Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101

Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47

DIRECT CURRENT

Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 46

DIRECTION FINDING

Polarimetry and Interferometry Applications – 55

DISASTERS

Guideline for Early Interventions – 142

Polarimetry and Interferometry Applications – 55

DISCONNECT DEVICES

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 67

DISORDERS

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

DISPLACEMENT

Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48

DISPLAY DEVICES

Heuristic Automation for Decluttering Tactical Displays – 66

Information Complexity in Air Traffic Control Displays – 182

Information Presentation – 146

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4

DISSOLVED GASES

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45

DISTORTION

Thin, nearly wireless adaptive optical device – 69

DISTRIBUTED INTERACTIVE SIMULATION

NASA Constellation Distributed Simulation Middleware Trade Study – 161

Sonar 3 VMSA Federate: User Guide and Technical Description – 157

DIURNAL VARIATIONS

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 81

DOCKING

Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 76

DOCUMENT MARKUP LANGUAGES

Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39

DOMESTIC ENERGY

Energy Industry, 2006 – 68

DOPED CRYSTALS

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31

DRONE VEHICLES

The Need for a USAF UAV Center of Excellence – 9

DRUGS

Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

DRY HEAT

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

DUNITE

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

DUST

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

DYNAMIC TESTS

Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69

E GLASS

Containerless Processing of a Lithium Disilicate Glass – 24

EARLY WARNING SYSTEMS

2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19

EAR

Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120

EARTH CORE

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192

EARTH CRUST

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83

EARTH MANTLE

Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle – 80

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192

EARTH (PLANET)

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

EARTH RADIATION BUDGET

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

EARTH ROTATION

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83

EARTH SCIENCES

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

EARTH TIDES

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83

EARTH-MOON SYSTEM

GCR-Induced Photon Luminescence of the Moon – 191

EARTHQUAKES

Polarimetry and Interferometry Applications – 55

Time Delay H(infinity) Control of Structures under Earthquake Loading – 44

EATING

Human Space Flight – 186

ECONOMICS

A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models – 158

A Toolkit for Building Hybrid, Multi-Resolution PMESII Models – 158

EDUCATION

Applying Knowledge Management Theory to Army Doctrine Development: Case Study of a Web-Based Community of Practice – 182

Battlemind Training: Building Soldier Resiliency – 138

Eastern European Science Needs Sweeping Changes – 89

Enhancing Mental Readiness in Military Personnel – 131

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196

Human Factors in Training – 110

Maximizing the Benefits of Training by Example and Direct Instruction – 154

Military Leader Perspectives of Psychological Fitness – 129

Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158

Morale as a Protection Factor against Mission Related Stress – 135

Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 3

Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127

Stress Training and the New Military Environment – 142

Veterinary Research Manpower Development for Defense – 102

EFFLUENTS

Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44

EGRESS

The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

ELASTIC BUCKLING

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

ELASTIC WAVES

The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 49

ELASTOMERS

Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 76

ELBOW (ANATOMY)

Relationship between Surface EMG and Angle of Elbow Joint – 108

ELECTRIC BATTERIES

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 48

ELECTRIC COILS

Embedded Control System Design and Practice: An Example by a FCU Controller – 45

ELECTRIC FIELDS

Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 29

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63

ELECTRIC POTENTIAL

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 45

ELECTRIC POWER

Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68

Wireless Instrumentation System and Power Management Scheme Therefore – 64

ELECTRIC RELAYS

Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 46

ELECTRICAL ENGINEERING

Method and Instrument for ECG Measurement Based on Two Electrodes – 118

ELECTRICAL IMPEDANCE

Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 109

Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 45

ELECTROCARDIOGRAPHY

Method and Instrument for ECG Measurement Based on Two Electrodes – 118

ELECTROCHEMICAL CAPACITORS

Hybrid Power Management System and Method – 64

ELECTROCHEMICAL SYNTHESIS

Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81

ELECTRODES

Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117

Method and Instrument for ECG Measurement Based on Two Electrodes – 118

ELECTRODYNAMICS

Normal and Differential SAR Interferometry – 58

ELECTROENCEPHALOGRAPHY

A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 117

Monitoring on Depth of Anesthesia Basing on a Rhythm Autocorrelation of EEG Signals – 90

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

ELECTROLYTES

Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81

ELECTROMAGNETIC INTERFERENCE

Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47

ELECTROMAGNETIC RADIATION

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Basics of SAR Polarimetry II – 57

Basics of SAR Polarimetry I – 58

Optimisation of Dallenbach Layers Using Real Materials – 171

ELECTROMAGNETIC SCATTERING

Polarimetric Interferometry – 56

ELECTROMAGNETIC SPECTRA

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extrawideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 61

ELECTROMAGNETIC WAVE TRANSMISSION

Sea Clutter Generation and Target Detection – 171

ELECTROMECHANICAL DEVICES

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 30

ELECTROMECHANICS

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 30

ELECTROMYOGRAPHY

Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107

Relationship between Surface EMG and Angle of Elbow Joint – 108

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

ELECTRON MICROSCOPES

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

ELECTRON MOBILITY

High Mobility Conjugated Polymers – 34

ELECTRON PARAMAGNETIC RESONANCE

Lunar Dust and Lunar Simulant Activation and Monitoring – 194

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

ELECTRONIC EQUIPMENT

Electronics Industry – 65

ELECTROPHORESIS

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63

ELECTROPHYSIOLOGY

Estimation of Percentage of Electrogastrogram Slow Wave Rhythm – 89

ELLIPSES

Basics of SAR Polarimetry I – 59

ELLIPTIC FUNCTIONS

Evaluating the Gradient of the Thin Wire Kernel – 167

EMBEDDING

Embedded Control System Design and Practice: An Example by a FCU Controller – 45

EMOTIONAL FACTORS

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

EMULSIONS

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81

ENDOCRINOLOGY

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

ENDOTHERMIC REACTIONS

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

END-TO-END DATA SYSTEMS

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

ENERGETIC PARTICLES

GCR-Induced Photon Luminescence of the Moon – 191

ENERGY BUDGETS

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

ENERGY CONSUMPTION

Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment – 9

ENERGY CONVERSION

Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29

ENERGY GAPS (SOLID STATE)

Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173

ENERGY TECHNOLOGY

Energy Industry, 2006 – 68

ENERGY TRANSFER

Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 29

ENGINE DESIGN

Method and apparatus for in-situ detection and isolation of aircraft engine faults – 76

Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26

Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section – 75

ENGINEERING

Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37

Review of Collaborative Tools for Planning and Engineering – 159

ENSTATITE

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192

ENTRY

Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193

ENVIRONMENT EFFECTS

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extrawideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 61

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

ENVIRONMENT MODELS

Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47

ENVIRONMENT POLLUTION

An Optimization Model of Sewage Rehabilitation – 38

ENVIRONMENTAL CLEANUP

Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

ENVIRONMENTAL SURVEYS

Environmental Assessment Golf Learning Center and Driving Range – 77

ENVIRONMENTS

Method and program product for determining a radiance field in an optical environment – 175

ENZYM INHIBITORS

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Major Biological Threat Agents – 99

ENZYMES

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Major Biological Threat Agents – 98

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

EPIDEMIOLOGY

Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

EQUATIONS OF MOTION

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

EQUILIBRIUM

Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146

ERROR CORRECTING CODES

Low Complexity Convolutional Codes of Rate 2/N – 38

ERRORS

An International Survey of Maintenance Human Factors Programs – 8

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

Knowledge-Based Control for Space Time Adaptive Processing – 52

Maximizing the Benefits of Training by Example and Direct Instruction – 154

Normal and Differential SAR Interferometry – 58

ESTIMATES

Estimation of Percentage of Electrogram Slow Wave Rhythm – 89

Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168

ESTIMATING

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

ETCHING

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

ETHICS

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

ETHYLENE

Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148

EUROPE

Eastern European Science Needs Sweeping Changes – 89

EVACUATING (TRANSPORTATION)

Early Interventions after Critical Incidents - Application – 139

EVALUATION

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

EVAPOTRANSPIRATION

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

EVOLUTION (DEVELOPMENT)

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

EXOBIOLOGY

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

Space Radiation Program Element – 113

EXOTHERMIC REACTIONS

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

EXPERT SYSTEMS

Expert System Constant False Alarm Rate (CFAR) Processor – 53

Introduction to Radar Signal and Data Processing: The Opportunity – 51

EXPLOSIONS

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

EXPOSURE

How to TRIM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104

Virtual Reality as a Tool in Early Interventions – 128

EXTERNAL TANKS

A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31

EXTRACTION

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

Multimedia Information Extraction – 183

Universal Share for the Sharing of Multiple Images – 40

EXTRATERRESTRIAL MATTER

Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 189

EXTRATERRESTRIAL RADIATION

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

Science Goals in Radiation Protection for Exploration – 197

Space Radiation Program Element – 113

EXTRAVEHICULAR ACTIVITY

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

Lunar Dust and Lunar Simulant Activation and Monitoring – 193

EYE MOVEMENTS

An Analysis of Relation between Changes of Pupil and Mental Workloads – 119

F-16 AIRCRAFT

Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment – 9

F-18 AIRCRAFT

Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5

FABRICATION

An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33

Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25

Increased alignment in carbon nanotube growth – 61

Multiple internal seal right micro-electromechanical system vacuum package – 62

Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108

FAILURE

An Optimization Model of Sewage Rehabilitation – 38

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34

FALSE ALARMS

Expert System Constant False Alarm Rate (CFAR) Processor – 53

FATIGUE LIFE

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75

FAULT DETECTION

Method and apparatus for in-situ detection and isolation of aircraft engine faults – 76

Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems – 7

FEAR

Battlemind Training: Building Soldier Resiliency – 138

FEEDBACK CONTROL

Control Theory Perspective of Effects-Based Thinking and Operations: Modeling 'Operations' as a Feedback Control System – 170

FEEDBACK

Control Theory Perspective of Effects-Based Thinking and Operations: Modeling 'Operations' as a Feedback Control System – 170

Fuselet Workflow Inspection and Feedback – 183

Method and apparatus for loss of control inhibitor systems – 11

FEMALES

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 122

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92

Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

FERTILITY

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105

FIBER LASERS

A High Power Frequency Doubled Fiber Laser – 73

FIELD EFFECT TRANSISTORS

High Mobility Conjugated Polymers – 34

FIGHTER AIRCRAFT

Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment – 9

FILMS

Comparative Packaging Study – 36

FISHERIES

Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173

FISHES

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28

- Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- FLAME TEMPERATURE**
Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31
- FLIGHT CHARACTERISTICS**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 20
- FLIGHT CLOTHING**
Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146
- FLIGHT CREWS**
Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146
- FLIGHT INSTRUMENTS**
Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87
- FLIGHT OPERATIONS**
Cargo Integration Products for External Release – 14
- FLIGHT SIMULATORS**
Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 4
- FLIGHT SURGEONS**
A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110
International Space Station Medical Operations – 122
- FLIGHT TEST VEHICLES**
The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 16
- FLIGHT TESTS**
Test and Verification Approach for the NASA Constellation Program – 12
- FLUID FLOW**
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107
Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107
- FLUID SHIFTS (BIOLOGY)**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
- FLUORIDES**
Functionalization of Carbon Nanotubes – 176
- FLYBY MISSIONS**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- FLYING PERSONNEL**
Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127
- FOCUSING**
Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174
- FOOD PROCESSING**
Comparative Packaging Study – 36
Effect of Processing and Subsequent Storage on Nutrition – 103
Thermostable Shelf Life Study – 103
- FOREARM**
Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107
- FORECASTING**
Evaluation and Application of the Weather Research and Forecast Model – 88
Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41
Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185
News Media Industry – 180
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
Space Industry – 16
Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13
- FORMATION FLYING**
Autonomous Formation Flight: Project Overview – 1
Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5
- FORMULATIONS**
Evaluating the Gradient of the Thin Wire Kernel – 167
- FOURIER TRANSFORMATION**
Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46
- FRACTIONATION**
Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- FRACTURE STRENGTH**
Stress Analysis and Fracture in Nanolaminate Composites – 26
- FRACTURING**
Stress Analysis and Fracture in Nanolaminate Composites – 26
- FREE RADICALS**
Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 29
- FREEZING**
Curation of Frozen Samples – 184
- FREQUENCIES**
Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- FREQUENCY RESPONSE**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- FRICION STIR WELDING**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33
Friction stir weld tools – 74
Friction Stir Weld Tools – 75
- FUEL CELLS**
Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81
- FUEL PUMPS**
Fast Track for a Slower Rocket Engine – 24
- FUELS**
Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment – 9
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- FULLERENES**
Are Fullerenes Relevant to Cosmochemistry? A New Finding – 179
- FUNCTIONAL ANALYSIS**
A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44
- FUNCTIONAL DESIGN SPECIFICATIONS**
Advanced Control Law Tuning and Performance Assessment – 152
Quantitative Robust Control Engineering: Theory and Applications – 151
- FUNCTIONS (MATHEMATICS)**
A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44
- FUSION WELDING**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31

FUZZY SYSTEMS

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155

GALACTIC COSMIC RAYS

GCR-Induced Photon Luminescence of the Moon – 191

GALACTIC RADIATION

Evaluations of Risks from the Lunar and Mars Radiation Environments – 197

GAME THEORY

Gambling Task (fMRI Revision 3.0.1) – 170

Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170

GAMMA RAY OBSERVATORY

GCR-Induced Photon Luminescence of the Moon – 191

GAMMA RAY TELESCOPES

GCR-Induced Photon Luminescence of the Moon – 191

GAS ANALYSIS

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

GAS CHROMATOGRAPHY

Thermal modulation for gas chromatography – 62

GAS DETECTORS

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

GAS EXCHANGE

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30

GAS MIXTURES

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45

GAS TUNGSTEN ARC WELDING

A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31

GASES

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30

GASTROINTESTINAL SYSTEM

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106

GELATINS

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 30

GENE EXPRESSION

Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

GENERAL AVIATION AIRCRAFT

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 5

GENERAL OVERVIEWS

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190

Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5

Generation Y Perspectives – 176

Human Factors in Training – 110

NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194

Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69

Reconstruction of the Genesis Entry – 21

Test and Verification Approach for the NASA Constellation Program – 11

GENESIS MISSION

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbide Target 60001 – 184

Reconstruction of the Genesis Entry – 21

Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193

GENES

Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91

Genomic Instability and Breast Cancer – 97

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

GENETICS

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

GENOME

Genomic Instability and Breast Cancer – 97

GEOCHEMISTRY

An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191

Duration of a Magma Ocean and Subsequent Mantle Overtum in Mars: Evidence from Nakhilites – 189

Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle – 79

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84

K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

GEOCHRONOLOGY

Duration of a Magma Ocean and Subsequent Mantle Overtum in Mars: Evidence from Nakhilites – 190

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

GEOMAGNETISM

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19

GEOMORPHOLOGY

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83

GERMANY

Family Support in the German Armed Forces – 139

GLASS

In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 25

GLIDERS

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42

GLOBAL POSITIONING SYSTEM

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

GLUCOSE

Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 176

GRAPHICAL USER INTERFACE

Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170

GRAVITATIONAL EFFECTS

Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

GRAVITATIONAL PHYSIOLOGY

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

Neuroscience in Space – 123

Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

GRAVITATION

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

GRID GENERATION (MATHEMATICS)

Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 10

GRIGG-SKJELLERUP COMET

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 188

GROUND EFFECT (COMMUNICATIONS)

Application of Knowledge-Based Techniques to Tracking Function – 54

GROUND OPERATIONAL SUPPORT SYSTEM

Methods and Systems for Advanced Spaceport Information Management – 15

GROUND TESTS

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 20

GROUND TRUTH

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extrawideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 61

GROWTH

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121

GUIDANCE (MOTION)

Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162

GUINEA PIGS

Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120

HABITABILITY

Acid Vapor Weathering of Apatite and Implications for Mars – 86

Human Research Program Requirements Document – 115

Spacecraft Internal Acoustic Environment Modeling – 172

HABITATS

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148

Human Space Flight – 186

New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79

Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104

The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196

HALF SPACES

The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 49

HALL EFFECT

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

Ion Focusing Improves Hall-Effect Thruster – 65

HALL THRUSTERS

Ion Focusing Improves Hall-Effect Thruster – 65

HALLEY'S COMET

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

HALOGEN OCCULTATION EXPERIMENT

Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86

HANDBOOKS

NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 183

HARNESSES

Cushion system for multi-use child safety seat – 37

Cushion System for Multi-Use Child Safety Seat – 74

HEAD DOWN TILT

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121

HEALTH PHYSICS

Science Goals in Radiation Protection for Exploration – 198

HEALTH

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131

International Space Station Medical Operations – 122

Life Sciences Data Archive (LSDA) – 103

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134

Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133

Risks Associated with Long-Term Spaceflight – 112

Space Radiation Program Element – 113

Spring 2006. Industry Study. Health Care Industry – 93

The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114

Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

HEART DISEASES

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

HEART FUNCTION

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118

Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115

HEART RATE

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

HEART

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121

HEAT MEASUREMENT

Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28

HEAT PIPES

Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74

HEAT TOLERANCE

Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94

HELICOPTERS

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data – 6

HELIUM ISOTOPES

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30

HELIUM

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30

HELMETS

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

HEMATITE

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhlite Mii03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 84

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

HEMATOPOIESIS

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102

HEMATOPOIETIC SYSTEM

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102

HEMODYNAMIC RESPONSES

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121

HEURISTIC METHODS

Heuristic Automation for Decluttering Tactical Displays – 66

Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170

HIGH POLYMERS

High Mobility Conjugated Polymers – 34

HIGH POWER LASERS

A High Power Frequency Doubled Fiber Laser – 73

Review of Laser Lightcraft Propulsion System (Preprint) – 16

HIGH SPEED

A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47

HIGH TEMPERATURE TESTS

Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74

HIGH TEMPERATURE

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192

HIGH THRUST

Ion Focusing Improves Hall-Effect Thruster – 65

HIGH VOLTAGES

Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68

H-INFINITY CONTROL

Time Delay H(infinity) Control of Structures under Earthquake Loading – 45

HISTORIES

Sputnik and the Dawn of the Space Age – 198

The American Military and the Media: Historical Lessons and Future Considerations – 181

HONEYCOMB STRUCTURES

STS-118 Radiator Impact Damage – 22

HORMONES

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100

Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101

HUMAN BEINGS

Risk, Psychiatry and the Modern Military – 132

HUMAN FACTORS ENGINEERING

An Analysis of Relation between Changes of Pupil and Mental Workloads – 119

An International Survey of Maintenance Human Factors Programs – 8

Applications of Human Factors in Space – 147

Derivation of Boundary Manikins: A Principal Component Analysis – 146

Human Factors Engineering Standards at NASA – 147

Human Factors in Human-Systems Integration – 150

Human Factors in Training – 110

Human Research Program Requirements Document – 115

NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 182

Population Analysis: Communicating in Context – 147

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147

HUMAN PERFORMANCE

An International Survey of Maintenance Human Factors Programs – 8

Human Factors in Human-Systems Integration – 150

Human Research Program Requirements Document – 115

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137

HUMAN-COMPUTER INTERFACE

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 149

Herc SAR Task 106: AIMS Feature Development – 156

HURRICANES

Modeling of Hurricane Impacts – 88

HYBRID PROPELLANTS

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

HYDROCARBONS

Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31

HYDRODYNAMICS

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155

HYDROGEN OXYGEN ENGINES

Fast Track for a Slower Rocket Engine – 24

HYDROGEN PEROXIDE

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

HYDROGEN

Catalytic dehydrogenation of amine borane complexes – 27

Functionalization of Carbon Nanotubes – 176

Hydrogen Reduction of Ilmenite from Lunar Regolith – 35

HYDROPHOBICITY

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 30

HYDROSTATIC PRESSURE

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

HYDROTHERMAL SYSTEMS

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84

HYDROXYL RADICALS

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45

HYOSCINE

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

HYPERSONIC WIND TUNNELS

Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – 70

HYPOBARIC ATMOSPHERES

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

HYPOGLYCEMIA

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

HYPOTENSION

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

HYPOXIA

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

HYSTERESIS

Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162

ICE FORMATION

Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 10

IDENTITIES

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

IFF SYSTEMS (IDENTIFICATION)

Universal Share for the Sharing of Multiple Images – 40

IGNEOUS ROCKS

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

ILMENITE

Hydrogen Reduction of Ilmenite from Lunar Regolith – 36

IMAGE ANALYSIS

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

IMAGE CLASSIFICATION

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

IMAGE PROCESSING

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175

Normal and Differential SAR Interferometry – 58

Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls – 63

Tracking of cells with a compact microscope imaging system with intelligent controls – 69

IMAGES

Correlation Based Testing for Passive Sonar Picture Rationalization – 166

RAP Simulation Environment Characteristics – 153

IMAGING SPECTROMETERS

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

IMAGING TECHNIQUES

Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 39

An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extradewband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 60

Atmospheric autorotating imaging device – 70

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 64

- Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – [184](#)
- Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – [55](#)
- Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – [172](#)
- Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – [193](#)
- The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – [17](#)
- Universal Share for the Sharing of Multiple Images – [40](#)
- Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – [115](#)
- IMMUNE SYSTEMS**
- Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – [107](#)
- Immune Function Changes during a Spaceflight-Analog Undersea Mission – [113](#)
- Incidence of Latent Virus Shedding during Space Flight – [111](#)
- Space Medicine and Medical Engineering, Volume 20, No. 4 – [105](#)
- Validation of Procedures for Monitoring Crewmember Immune Function – [109](#)
- IMMUNOLOGY**
- Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – [96](#)
- IMPACT DAMAGE**
- STS-118 Radiator Impact Damage – [22](#)
- IMPACTORS**
- Collisional Processing of Olivine and Pyroxene in Cometary Dust – [187](#)
- Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – [188](#)
- IMPLANTATION**
- In vivo electrode implanting system – [89](#)
- IN SITU MEASUREMENT**
- Method and apparatus for in-situ detection and isolation of aircraft engine faults – [76](#)
- IN SITU RESOURCE UTILIZATION**
- Hydrogen Reduction of Ilmenite from Lunar Regolith – [36](#)
- In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – [195](#)
- NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – [194](#)
- IN VITRO METHODS AND TESTS**
- Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – [107](#)
- Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – [90](#)
- Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – [108](#)
- Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – [102](#)
- Space Medicine and Medical Engineering, Volume 20, No. 4 – [105](#)
- IN VIVO METHODS AND TESTS**
- In vivo electrode implanting system – [89](#)
- INDEXES (DOCUMENTATION)**
- Indexpro: An Efficient Protein Indexing System Based on Knot Theory – [40](#)
- INDIA**
- Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – [91](#)
- INDIUM ANTIMONIDES**
- Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – [29](#)
- INDIUM ARSENIDES**
- Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – [29](#)
- INDOOR AIR POLLUTION**
- Model Prediction of Indoor Particle Concentrations in a Public School Classroom – [47](#)
- INDUCED DRAG**
- Autonomous Formation Flight: Project Overview – [1](#)
- INDUSTRIES**
- Biotechnology Industry, 2006 – [145](#)
- Electronics Industry – [65](#)
- Energy Industry, 2006 – [67](#)
- News Media Industry – [180](#)
- Space Industry – [16](#)
- Spring 2006. Industry Study. Health Care Industry – [93](#)
- Spring 2006. Industry Study. Information Technology Industry – [180](#)
- The Aircraft Industry, 2006 – [10](#)
- INERTIAL NAVIGATION**
- Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – [39](#)
- INFECTIOUS DISEASES**
- Incidence of Latent Virus Shedding during Space Flight – [112](#)
- Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – [98](#)
- INFERENCE**
- Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – [49](#)
- INFILTRATION**
- Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – [109](#)
- INFLATABLE STRUCTURES**
- Cushion system for multi-use child safety seat – [37](#)
- IN-FLIGHT MONITORING**
- Validation of Procedures for Monitoring Crewmember Immune Function – [110](#)
- INFORMATION ANALYSIS**
- Data Mining SIAM Presentation – [162](#)
- INFORMATION MANAGEMENT**
- Applying Knowledge Management Theory to Army Doctrine Development: Case Study of a Web-Based Community of Practice – [182](#)
- Methods and Systems for Advanced Spaceport Information Management – [15](#)
- The Power of a Question: A Case Study of Two Organizational Knowledge Capture Systems – [177](#)
- INFORMATION RETRIEVAL**
- Data Mining and Homeland Security: An Overview – [179](#)
- Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – [179](#)
- Multimedia Information Extraction – [183](#)
- Survey of Event Processing – [183](#)
- INFORMATION SYSTEMS**
- Fuselet Workflow Inspection and Feedback – [183](#)
- Information Presentation – [146](#)
- Mission Medical Information System – [115](#)
- Spring 2006. Industry Study. Information Technology Industry – [180](#)
- Wireless Cooperative Networks: Self-Configuration and Optimization – [66](#)
- INFORMATION THEORY**
- Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – [180](#)
- Information Theoretic Radar Waveform Design for Multiple Targets – [164](#)

INFRARED DETECTORS

Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 23

INFRARED IMAGERY

Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

INFRARED RADIATION

AIMSsim Version 2.2.1, User Manual – 157

Herc SAR Task 106: AIMS Feature Development – 156

Interband cascade detectors – 176

INFRARED RADIOMETERS

Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 23

INFRARED SPECTROMETERS

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

INFRARED SPECTROSCOPY

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 98

INGOTS

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44

INHIBITORS

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 99

Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis – 99

Structure and Mechanism-Based Design of ErbB Receptor Inhibitors – 98

INJURIES

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134

Risk, Psychiatry and the Modern Military – 132

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

INSECTICIDES

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

INSERTS

Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94

INSPECTION

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

Fuselet Workflow Inspection and Feedback – 183

Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10

INSTALLING

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Canula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

INSTRUMENTS

Wireless Instrumentation System and Power Management Scheme Therefore – 64

INSULATION

Process for Self-Repair of Insulation Material – 25

Process for self-repair of insulation material – 33

INTELLIGENCE

Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179

Efficient Pathfinding in Very Large Data Spaces – 159

Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164

INTERFEROMETRY

Polarimetry and Interferometry Applications – 55

Radar Polarimetry and Interferometry – 54

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

INTERLEUKINS

Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107

Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91

INTERMETALLICS

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34

INTERNATIONAL RELATIONS

Conversations with Rebecca Spyke Keiser. Interview by Frank Sietzen – 185

INTERNATIONAL SPACE STATION

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110

Conversations with Rebecca Spyke Keiser. Interview by Frank Sietzen – 185

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 66

Foot Reaction Forces during Long Duration Space Flight – 109

Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113

Incidence of Latent Virus Shedding during Space Flight – 111

International Space Station Medical Operations – 122

International Space Station Medical Project – 113

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19

STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147

INTERNETS

A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40

Development and Results of CORA DWAN Website Survey – 184

Fuselet Workflow Inspection and Feedback – 183

News Media Industry – 180

INTEROPERABILITY

A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models – 158

- An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46
- INTERPLANETARY DUST**
- N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187
- New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 188
- INTERPLANETARY SPACECRAFT**
- The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21
- INVERSIONS**
- Polarimetric Interferometry - Remote Sensing Applications – 58
- ION ENGINES**
- NEXT Ion Propulsion System Development Status and Performance – 23
- ION PROPULSION**
- Ion Focusing Improves Hall-Effect Thruster – 65
- NEXT Ion Propulsion System Development Status and Performance – 23
- IONIZING RADIATION**
- Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- IONOSPHERIC PROPAGATION**
- Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185
- IRON METEORITES**
- Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188
- IRON OXIDES**
- Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 85
- IRON**
- L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
- IRRADIANCE**
- Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94
- IRRADIATION**
- 5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104
- ISOLATION**
- Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems – 7
- ISOTOPES**
- Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28
- N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187
- JET AIRCRAFT NOISE**
- Quiet Spike: Softening the Sonic Boom – 9
- JET ENGINES**
- Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31
- JOINTS (ANATOMY)**
- Relationship between Surface EMG and Angle of Elbow Joint – 108
- KALMAN FILTERS**
- Application of Knowledge-Based Techniques to Tracking Function – 54
- Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- KAMACITE**
- Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188
- KERNEL FUNCTIONS**
- Evaluating the Gradient of the Thin Wire Kernel – 167
- KNOWLEDGE BASED SYSTEMS**
- Application of Knowledge-Based Techniques to Tracking Function – 54
- Efficient Pathfinding in Very Large Data Spaces – 159
- Fundamentals of Knowledge-Based Techniques – 54
- Impact of Knowledge-Based Techniques on Emerging Technologies – 52
- Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52
- Introduction to Radar Signal and Data Processing: The Opportunity – 51
- Knowledge-Based Control for Space Time Adaptive Processing – 52
- Knowledge-Based Radar Signal and Data Processing – 50
- Knowledge-Based Solutions as They Apply to the General Radar Problem – 51
- KNOWLEDGE REPRESENTATION**
- Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 178
- The Power of a Question: A Case Study of Two Organizational Knowledge Capture Systems – 177
- LABORATORY EQUIPMENT**
- A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- LACTIC ACID**
- Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- LANDING SITES**
- Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- LASER BEAMS**
- Review of Laser Lightcraft Propulsion System (Preprint) – 16
- LASER COOLING**
- A High Power Frequency Doubled Fiber Laser – 73
- LASER MATERIALS**
- Conversion of type of quantum well structure – 61
- Conversion of Type of Quantum Well Structure – 64
- LASER OUTPUTS**
- A High Power Frequency Doubled Fiber Laser – 73
- LASER PROPULSION**
- Review of Laser Lightcraft Propulsion System (Preprint) – 16
- LASER-INDUCED BREAKDOWN SPECTROSCOPY**
- Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174
- LASERS**
- Quantum Optics Initiative – 73
- LATERAL STABILITY**
- Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003 – 40
- LAUNCHING BASES**
- Methods and Systems for Advanced Spaceport Information Management – 15
- Shuttle to Orion: First Steps Back to Orbit – 18
- LAUNCHING PADS**
- Shuttle to Orion: First Steps Back to Orbit – 18
- LAUNCHING**
- Project VANGUARD Report No. 2, Report of Progress – 14
- Sputnik and the Dawn of the Space Age – 198

LAW (JURISPRUDENCE)

TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161

LEAD TITANATES

Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35

LEADERSHIP

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Leader Actions to Enhance Soldier Resiliency in Combat – 140

Military Leader Perspectives of Psychological Fitness – 129

Military Leader's Role in Psychological Support during Deployment – 137

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

LEARNING

Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120

LENGTH

Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107

LENSES

Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174

LEUKOCYTES

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 103

LIE GROUPS

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

LIFE CYCLE COSTS

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147

LIFE (DURABILITY)

Thermostable Shelf Life Study – 103

LIFE SCIENCES

Incidence of Latent Virus Shedding during Space Flight – 112

Life Sciences Data Archive (LSDA) – 103

LIFE SUPPORT SYSTEMS

A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131

Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Lunar Outpost Technologies Breakeven Study – 145

The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196

LIGANDS

Structure and Mechanism-Based Design of ErbB Receptor Inhibitors – 98

Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93

LIGHTNING

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 81

LIGNIN

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31

LINE OF SIGHT

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

LINEAR ENERGY TRANSFER (LET)

Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104

LINEAR POLARIZATION

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

LINEAR QUADRATIC GAUSSIAN CONTROL

Advanced Control Law Tuning and Performance Assessment – 152

LINEAR TRANSFORMATIONS

The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 49

LIPIDS

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

LIQUEFIED GASES

High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23

LIQUID CHROMATOGRAPHY

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

Effects of Psoralen on ADR Multidrug Resistance and Ca²⁺ Concentration in MCF-7/ADR Cells – 117

LIQUID CRYSTALS

Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts) – 29

LIQUID PHASES

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

LITHIUM ALUMINUM HYDRIDES

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

LITHIUM COMPOUNDS

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

LITHIUM HYDROXIDES

Kinetics of Reaction between LiOH - H₂O and CO₂ – 120

LITHIUM

Containerless Processing of a Lithium Disilicate Glass – 24

In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24

LITHOLOGY

Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185

LITHOSPHERE

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80

LOADS (FORCES)

Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107

Relationship between Surface EMG and Angle of Elbow Joint – 108

LOGISTICS

The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196

LONG DURATION SPACE FLIGHT

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

- Foot Reaction Forces during Long Duration Space Flight – 109
- International Space Station Medical Project – 113
- Risks Associated with Long-Term Spaceflight – 112
- Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- LOW COST**
- Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 4
- LOW DENSITY MATERIALS**
- Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32
- LOW EARTH ORBITS**
- Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 76
- Human Space Flight – 186
- LOW SPEED**
- Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 150
- LUMINESCENCE**
- GCR-Induced Photon Luminescence of the Moon – 191
- LUNAR BASES**
- A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148
- In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – 195
- Lunar Outpost Technologies Breakeven Study – 145
- The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196
- LUNAR CRATERS**
- Curation of Frozen Samples – 184
- LUNAR DUST**
- Lunar Dust and Lunar Simulant Activation and Monitoring – 194
- Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104
- LUNAR ENVIRONMENT**
- Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190
- LUNAR GEOLOGY**
- NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- LUNAR LOGISTICS**
- Lunar Outpost Technologies Breakeven Study – 145
- LUNAR MODULE**
- Lunar Dust and Lunar Simulant Activation and Monitoring – 194
- LUNAR RADIATION**
- Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- LUNAR RESOURCES**
- Hydrogen Reduction of Ilmenite from Lunar Regolith – 36
- LUNAR ROCKS**
- Hydrogen Reduction of Ilmenite from Lunar Regolith – 36
- Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190
- LUNAR SPACECRAFT**
- Current Issues in Human Spacecraft Thermal Control Technology – 193
- LUNAR SURFACE**
- In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – 195
- The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196
- LYMPHATIC SYSTEM**
- Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer – 100
- LYMPHOCYTES**
- Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124
- MAGMA**
- Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78
- Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192
- MAGNESIUM COMPOUNDS**
- Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- MAGNETIC DIPOLES**
- Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106
- MAGNETIC PROPERTIES**
- Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer – 167
- MAGNETIC RESONANCE**
- Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 39
- MAGNETIZATION**
- Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80
- MAIN SEQUENCE STARS**
- Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187
- MAINTENANCE**
- An International Survey of Maintenance Human Factors Programs – 8
- An Optimization Model of Sewage Rehabilitation – 37
- Augmented Reality for Maintenance and Repair (ARMAR) – 160
- MALES**
- Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 122
- Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140
- MAMMALS**
- Marine Mammals and Active Sonar – 172
- MAMMARY GLANDS**
- Evaluation of Listeria Monocytogenes Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97
- Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96
- Genomic Instability and Breast Cancer – 97
- Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93
- Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101
- Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92
- Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102
- The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99
- Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101
- Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93

- Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96
- MAN MACHINE SYSTEMS**
Method and apparatus for loss of control inhibitor systems – 11
- MANAGEMENT INFORMATION SYSTEMS**
Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- MANAGEMENT PLANNING**
2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- MANAGEMENT SYSTEMS**
Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41
How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133
Hybrid Power Management System and Method – 64
- MANGANESE**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 188
- MANNED SPACE FLIGHT**
Changes in Calcium Metabolism during Space Flight – 122
Human Factors Engineering Standards at NASA – 147
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Incidence of Latent Virus Shedding during Space Flight – 111
International Space Station Medical Project – 113
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
Risks Associated with Long-Term Spaceflight – 112
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146
- MANNED SPACECRAFT**
Current Issues in Human Spacecraft Thermal Control Technology – 193
- MANPOWER**
Veterinary Research Manpower Development for Defense – 102
- MANUALS**
AIMSsim Version 2.2.1, User Manual – 157
- Gun Control for VBE-E: User Guide and Technical Description – 159
NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 182
Sonar 3 VMSA Federate: User Guide and Technical Description – 157
- MAPPING**
A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80
New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79
- MARINE BIOLOGY**
Marine Mammals and Active Sonar – 172
- MARINE CHEMISTRY**
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- MARINE ENVIRONMENTS**
A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155
- MARINE MAMMALS**
Marine Mammals and Active Sonar – 172
- MARKERS**
Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96
- MARKET RESEARCH**
Energy Industry, 2006 – 68
- MARKOV CHAINS**
Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 150
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- MARKOV PROCESSES**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- MARS CRATERS**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- MARS ENVIRONMENT**
Acid Vapor Weathering of Apatite and Implications for Mars – 86
- Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- MARS EXPLORATION**
Acid Vapor Weathering of Apatite and Implications for Mars – 86
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
Planetary Protection Provisions for Mars: Forward and Back Considerations – 14
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- MARS MISSIONS**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- MARS (PLANET)**
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 190
- MARS POLAR LANDER**
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
- MARS ROVING VEHICLES**
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
- MARS SURFACE**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
Ancient Hydrothermal Springs in Arabia Terra, Mars – 195
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
Curation of Frozen Samples – 184

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

MARS VOLCANOES

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191

MASS SPECTRA

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

MASS SPECTROMETERS

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

MASS TRANSFER

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

MATHEMATICAL MODELS

A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40

Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38

Capability Maturity Model (Trademark) Integration (CMMI (Service Mark)), Version 1.1. CMMI (Service Mark) for Software Engineering (CMMI-SW, V1.1) – 156

Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37

Mathematical Approach to the Evaluation and Planning of Influence Operations – 168

Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems – 7

Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46

Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146

Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106

MATRICES (MATHEMATICS)

Knowledge-Based Control for Space Time Adaptive Processing – 53

The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48

MATRIX MATERIALS

Stress Analysis and Fracture in Nanolaminate Composites – 26

MAXWELL EQUATION

Basics of SAR Polarimetry II – 57

MEASURING INSTRUMENTS

Measuring Morale within the French Army – 125

Method and Instrument for ECG Measurement Based on Two Electrodes – 118

MECHANICAL PROPERTIES

Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers – 67

Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32

MEDICAL PERSONNEL

Early Interventions after Critical Incidents - Application – 139

International Space Station Medical Operations – 122

The Mental Health Needs Assessment – 126

MEDICAL SCIENCE

AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95

International Space Station Medical Operations – 122

The Mental Health Needs Assessment – 126

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

Veterinary Research Manpower Development for Defense – 102

MEDICAL SERVICES

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

Deployment Support - Strength through Partnership – 138

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129

Early Interventions after Critical Incidents - Application – 138

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

Spring 2006. Industry Study. Health Care Industry – 93

MEMBRANE STRUCTURES

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48

MEMBRANES

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 108

Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81

MEMORY (COMPUTERS)

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 150

MEMORY

Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120

MENTAL HEALTH

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

Commander - Unit Psychologist: A Powerful Tandem – 137

Enhancing Mental Readiness in Military Personnel – 131

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136

Guideline for Early Interventions – 141

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132

Military Leader Perspectives of Psychological Fitness – 129

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

The Mental Health Needs Assessment – 126

The Navy's Support to Sailors in Operations and their Families in France – 134

Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140

MENTAL PERFORMANCE

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

An Analysis of Relation between Changes of Pupil and Mental Workloads – 119

Cognitive Functioning in Long Duration Head-down Bed Rest – 109

Human Space Flight – 186

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

METAL JOINTS

An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33

METALLOGRAPHY

An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33

METAMORPHISM (GEOLOGY)

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

METASTASIS

Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer – 100

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

METEORITES

N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

METEORITIC COMPOSITION

K/Th in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

METEOROLOGICAL PARAMETERS

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13

METEOROLOGY

Evaluation and Application of the Weather Research and Forecast Model – 88

METHODOLOGY

Functionalization of Carbon Nanotubes – 176

METRIC PHOTOGRAPHY

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

MICE

Evaluation of *Listeria monocytogenes* Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105

MICROELECTROMECHANICAL SYSTEMS

Multiple internal seal right micro-electromechanical system vacuum package – 62

Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29

MICROGRAVITY

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

Neuroscience in Space – 123

MICROMETEORITIDS

STS-118 Radiator Impact Damage – 22

MICROPARTICLES

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

MICROSCOPES

Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193

Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls – 63

MICROSCOPY

Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls – 64

Tracking of cells with a compact microscope imaging system with intelligent controls – 69

MICROSTRUCTURE

Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32

MICROWAVE HOLOGRAPHY

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 65

MICROWAVE IMAGERY

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 65

MICROWAVE TUBES

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

MICROWAVES

Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44

MID-OCEAN RIDGES

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80

MIGRATION

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

MILITARY OPERATIONS

2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

Assessing the Adequacy of Coverage of Joint Command and Control in the Capstone Concept for Joint Operations – 49

Close Air Support Command and Control at the Operational Level – 50

Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 130

Family Support in the German Armed Forces – 139

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134

Military Leader's Role in Psychological Support during Deployment – 137

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130

RAP Simulation Environment Characteristics – 153

Risk, Psychiatry and the Modern Military – 132

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

Stress Training and the New Military Environment – 142

The American Military and the Media: Historical Lessons and Future Considerations – 181

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – 17

The Mental Health Needs Assessment – 126

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997 – 139

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

MILITARY PERSONNEL

AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95

Battlemind Training: Building Soldier Resiliency – 138

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129

Enhancing Mental Readiness in Military Personnel – 131

Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 130

Family Support in the German Armed Forces – 139

French Army - Family Psychological and Social Support – 144

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136

How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Leader Actions to Enhance Soldier Resiliency in Combat – 140

Measuring Morale within the French Army – 125

Military Leader Perspectives of Psychological Fitness – 129

My Father is a Soldier - A Children's Book – 133

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137

Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport – 141

Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

Stress Training and the New Military Environment – 142

Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997 – 139

MILITARY PSYCHOLOGY

Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 131

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

The Mental Health Needs Assessment – 126

The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997 – 139

MILITARY TECHNOLOGY

Basic and Operational Doctrine for Airpower in Irregular Warfare – 18

Electronics Industry – 65

The Need for a USAF UAV Center of Excellence – 9

MILLIMETER WAVES

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 65

Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68

MIMO (CONTROL SYSTEMS)

Quantitative Robust Control Engineering: Theory and Applications – 151

MINERAL DEPOSITS

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

MINERALOGY

An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83

Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192

The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84

MINERALS

Acid Vapor Weathering of Apatite and Implications for Mars – 86

Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

Polarimetry and Interferometry Applications – 55

Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190

MINIATURIZATION

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

Method and Instrument for ECG Measurement Based on Two Electrodes – 118

MIRRORS

Thin, nearly wireless adaptive optical device – 69

MISSION PLANNING

Collaborative Mission Design at NASA Langley Research Center – 169

The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114

MOBILITY

High Mobility Conjugated Polymers – 34

MODELS

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190

Bootstrap data methodology for sequential hybrid model building – 12

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27

Early Design Choices: Capture, Model, Integrate, Analyze, Simulate – 171

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

Modeling of Hurricane Impacts – 87

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

Sea Clutter Generation and Target Detection – 171

Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166

MODULATION

Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47

MODULATORS

Thermal modulation for gas chromatography – 62

MOLECULAR CLOUDS

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187

MOLECULES

Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17

MOLYBDENUM

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

MONTE CARLO METHOD

Method and program product for determining a radiance field in an optical environment – 175

Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168

MOORING

New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42

MORALE

How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 124

Measuring Morale within the French Army – 125

Morale as a Protection Factor against Mission Related Stress – 135

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997 – 139

MORPHOLOGY

Modeling and Optimization for Morphing Wing Concept Generation II – 6

Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82

MORTARS (MATERIAL)

The 2009 Version of the Aeroprediction Code: The AP09 – 2

MOSSBAUER EFFECT

An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhlite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83

MOTION

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 149

MOTIVATION

AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95

Family Support in the German Armed Forces – 139

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

MULTIMEDIA

Multimedia Information Extraction – 183

MULTIPHASE FLOW

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

MULTISENSOR APPLICATIONS

AIMSsim Version 2.2.1, User Manual – 157

Herc SAR Task 106: AIMS Feature Development – 156

MULTISENSOR FUSION

A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80

Correlation Based Testing for Passive Sonar Picture Rationalization – 165

Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179

Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164

MULTISTATIC RADAR

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

MULTIVARIABLE CONTROL

Advanced Control Law Tuning and Performance Assessment – 152

Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12

MUSCLES

Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107

Relationship between Surface EMG and Angle of Elbow Joint – 108

MUSCULOSKELETAL SYSTEM

Changes in Calcium Metabolism during Space Flight – 122

Foot Reaction Forces during Long Duration Space Flight – 109

MUTAGENESIS

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

NAKHLITES

Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 190

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhlite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83

NANOCOMPOSITES

Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 30

Stress Analysis and Fracture in Nanolaminate Composites – 26

NANOFABRICATION

Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24

Nanoengineered thermal materials based on carbon nanotube array composites – 63

NANOPARTICLES

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44

NANOSATELLITES

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

NANOSTRUCTURE (CHARACTERISTICS)

Stress Analysis and Fracture in Nanolaminate Composites – 26

NANOSTRUCTURE GROWTH

Increased alignment in carbon nanotube growth – 61

NANOSTRUCTURES (DEVICES)

Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32

NANOTECHNOLOGY

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

Functionalization of carbon nanotubes – 62

Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – 25

NRL Review, 2004 – 43

NASA PROGRAMS

A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glimpse into the Future – 31

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190

Collaborative Mission Design at NASA Langley Research Center – 168

Conversations with Rebecca Spyeke Keiser. Interview by Frank Sietzen – 185

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

Generation Y Perspectives – 176

Life Sciences Data Archive (LSDA) – 103

NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

Space Radiation Program Element – 113

Test and Verification Approach for the NASA Constellation Program – 11

NASA SPACE PROGRAMS

Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113

NATIONAL AIRSPACE SYSTEM

Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5

NATURAL LANGUAGE PROCESSING

Data Mining SIAM Presentation – 162

NAVY

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155

The Navy's Support to Sailors in Operations and their Families in France – 134

NEAR FIELDS

Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174

NEAR INFRARED RADIATION

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 98

NEEDLES

Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117

Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 97

NERVES

Estimation of Percentage of Electrogastrogram Slow Wave Rhythm – 89

NERVOUS SYSTEM

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

NETWORKS

Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8

NEURAL NETS

Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 80

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106

NEUROLOGY

Neuroscience in Space – 123

NEURONS

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

NEUROPHYSIOLOGY

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91

NEWS MEDIA

News Media Industry – 181

The American Military and the Media: Historical Lessons and Future Considerations – 181

The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – 17

NICKEL ALLOYS

Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32

NIOBATES

Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35

NOISE REDUCTION

Quiet Spike: Softening the Sonic Boom – 9

NONDESTRUCTIVE TESTS

Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10

NONLINEAR EQUATIONS

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

NONLINEAR SYSTEMS

A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44

Physics-Based Aeroelastic Analysis for Future Air Vehicle Concepts Using a Fully Nonlinear Methodology – 7

NONLINEARITY

Data-Driven Robust Control Design: Unfalsified Control – 151

Physics-Based Aeroelastic Analysis for Future Air Vehicle Concepts Using a Fully Nonlinear Methodology – 7

Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168

Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162

NOREPINEPHRINE

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

NORMS

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

NORTH AMERICA

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88

NORTH ATLANTIC TREATY ORGANIZATION (NATO)

2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19

NOTCHES

Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis – 99

NUCLEAR MAGNETIC RESONANCE

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

NUMERICAL ANALYSIS

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

NUTRITIONAL REQUIREMENTS

Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42

NUTRITION

Effect of Processing and Subsequent Storage on Nutrition – 103

International Space Station Medical Operations – 122

Thermostable Shelf Life Study – 103

NYLON (TRADEMARK)

Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers – 67

O STARS

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

OBSERVATORIES

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28

OBSTACLE AVOIDANCE

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

OCEAN BOTTOM

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80

OCEAN MODELS

Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163

Coastal Sediment Transport Models and Mixed Particle Size Dynamics – 164

U.S. GODALE: Global Ocean Prediction With the HYbrid Coordinate Ocean Model – 163

OCEANS

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle – 79

Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28

Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80

- Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- U.S. GODALE: Global Ocean Prediction With the HYbrid Coordinate Ocean Model – 163
- OLIVINE**
- Acid Vapor Weathering of Apatite and Implications for Mars – 86
- Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
- Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83
- Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
- New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82
- Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 188
- OPERATIONS RESEARCH**
- Mathematical Approach to the Evaluation and Planning of Influence Operations – 168
- The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- OPTICAL EQUIPMENT**
- Thin, nearly wireless adaptive optical device – 69
- OPTICAL FIBERS**
- Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 176
- OPTICAL MATERIALS**
- Thin, nearly wireless adaptive optical device – 69
- OPTICAL MEASUREMENT**
- Method and program product for determining a radiance field in an optical environment – 175
- OPTICAL MEASURING INSTRUMENTS**
- Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- OPTICAL RADAR**
- New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79
- OPTICAL TRACKING**
- Tracking of cells with a compact microscope imaging system with intelligent controls – 70
- OPTIMAL CONTROL**
- Advanced Control Law Tuning and Performance Assessment – 152
- OPTIMIZATION**
- An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- An Optimization Model of Sewage Rehabilitation – 37
- Optimisation of Dallenbach Layers Using Real Materials – 171
- Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101
- Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- ORBITS**
- Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 14
- ORGANIZATIONS**
- Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180
- The Power of a Question: A Case Study of Two Organizational Knowledge Capture Systems – 177
- ORTHOGONAL FUNCTIONS**
- Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- ORTHOSTATIC TOLERANCE**
- Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
- OSTEOBLASTS**
- Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- OTOLITH ORGANS**
- Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111
- OUTCROPS**
- Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- OXIDATION**
- L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
- OXYGEN ISOTOPES**
- Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- OXYGEN PRODUCTION**
- Hydrogen Reduction of Ilmenite from Lunar Regolith – 36
- OXYGEN SUPPLY EQUIPMENT**
- Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146
- OXYGEN**
- Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146
- Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
- PACKAGING**
- Comparative Packaging Study – 36
- PACKET SWITCHING**
- A Sliding-Window Parallel Packet Switch for High-speed Networks – 150
- Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149
- PACKET TRANSMISSION**
- A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40
- PANELS**
- STS-118 Radiator Impact Damage – 22
- PANORAMIC SCANNING**
- Atmospheric autorotating imaging device – 70
- PARAFFINS**
- Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- PARAMETER IDENTIFICATION**
- Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Parameter Estimation of PCs via STFT Zooming and Phase Jump Mapping – 46
- PARTICULATES**
- Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47
- Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- PATHOGENESIS**
- Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- PATTERN RECOGNITION**
- Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175
- Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- PAYLOADS**
- Collaborative Mission Design at NASA Langley Research Center – 169

PENETRATION

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

PEPTIDES

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Major Biological Threat Agents – 99

Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – 96

PERFORMANCE PREDICTION

Bootstrap data methodology for sequential hybrid model building – 12

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149

Quantitative Robust Control Engineering: Theory and Applications – 151

PERSONNEL

An International Survey of Maintenance Human Factors Programs – 8

PETROGRAPHY

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82

PETROLOGY

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

PHARMACOLOGY

A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123

Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

PHASE LOCKED SYSTEMS

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 48

PHASED ARRAYS

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

Introduction to Radar Signal and Data Processing: The Opportunity – 51

PHENOTYPE

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91

Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102

PHOSPHORS

Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – 70

PHOSPHORUS

Acid Vapor Weathering of Apatite and Implications for Mars – 86

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

PHOTOCHEMICAL REACTIONS

N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187

PHOTOEXCITATION

Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173

PHOTOGRAMMETRY

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

PHOTOGRAPHY

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

PHOTONS

Interband cascade detectors – 176

PHOTOVOLTAIC CELLS

Hybrid Power Management System and Method – 64

PHOTOVOLTAIC EFFECT

High Mobility Conjugated Polymers – 34

PHYSICAL EXERCISE

Deployment Support - Strength through Partnership – 138

Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95

Foot Reaction Forces during Long Duration Space Flight – 109

PHYSICAL FITNESS

AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95

PHYSIOLOGICAL EFFECTS

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119

Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165

Neuroscience in Space – 123

PHYSIOLOGICAL RESPONSES

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107

Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90

Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

PHYSIOLOGY

Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127

Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112

PIEZOELECTRIC CRYSTALS

Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35

PILOT PERFORMANCE

Development of an Aeromedical Scientific Information System for Aviation Safety – 3

PILOT SELECTION

Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data – 7

PILOTLESS AIRCRAFT

The Need for a USAF UAV Center of Excellence – 9

Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5

PILOTS

Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4

Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data – 6

PINS

Friction stir weld tools – 74

PIPES (TUBES)

Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74

PLANETARY EVOLUTION

Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 190

PLANETARY GEOLOGY

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

PLANETARY PROTECTION

Planetary Protection Provisions for Mars: Forward and Back Considerations – 14

- The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- PLANNING**
Review of Collaborative Tools for Planning and Engineering – 159
- PLANT GROWTH REGULATORS**
Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148
- PLASMA RADIATION**
Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- PLASMAS (PHYSICS)**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- PLASTIC DEFORMATION**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- PLASTICS**
Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35
- PLUGS**
Gun Control for VBE-E: User Guide and Technical Description – 160
- POINCARÉ SPHERES**
Basics of SAR Polarimetry I – 59
- POLARIMETRY**
A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152
Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60
Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59
Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extradwideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 60
Basics of SAR Polarimetry II – 57
Basics of SAR Polarimetry I – 58
Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72
Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57
Polarimetric Detection of Targets in Inhomogeneous Clutter – 72
- Polarimetric Interferometry - Remote Sensing Applications – 58
Polarimetric Interferometry - Target Detection Applications – 55
Polarimetric Interferometry – 56
Polarimetry and Interferometry Applications – 55
Present and Future Airborne and Spaceborne Systems – 59
Radar Polarimetry and Interferometry – 54
Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55
- POLARIZATION CHARACTERISTICS**
Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60
- POLARIZATION (WAVES)**
Basics of SAR Polarimetry II – 57
Basics of SAR Polarimetry I – 58
- POLICIES**
An International Survey of Maintenance Human Factors Programs – 8
Electronics Industry – 65
Space Industry – 16
The American Military and the Media: Historical Lessons and Future Considerations – 181
- POLYAMIDE RESINS**
Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35
- POLYCHLORINATED BIPHENYLS**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- POLYCRYSTALS**
Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29
- POLYMERIC FILMS**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- POLYMERS**
Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24
Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts) – 29
- POLYMORPHISM**
Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91
- Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90
- POLYNOMIALS**
A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44
- POLYPROPYLENE**
Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35
- POPULATIONS**
A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80
Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173
New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79
Population Analysis: Communicating in Context – 147
Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- POROSITY**
Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25
- POSITIONING**
Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- POSTURE**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111
- POWDER (PARTICLES)**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- POWER**
Hybrid Power Management System and Method – 64
- PRECIPITATION (METEOROLOGY)**
Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- PRECISION**
Equipment and Testing Procedures for Small Strain Triaxial Tests – 41
- PREDICTIONS**
Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II – 150
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163

Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152

Molecular and Clinical Predictors of Aggressive Prostate Cancer – 91

The 2009 Version of the Aeroprediction Code: The AP09 – 2

PRESSURE EFFECTS

In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 25

PRESSURE

Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192

PREVENTION

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 135

Morale as a Protection Factor against Mission Related Stress – 135

New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling – 100

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

PRIMATES

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 103

PRINCIPAL COMPONENTS ANALYSIS

Derivation of Boundary Manikins: A Principal Component Analysis – 146

PRIVACY

Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179

PROCEDURES

Guideline for Early Interventions – 142

PROCUREMENT

The Need for a USAF UAV Center of Excellence – 9

PROGNOSIS

Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93

PROGRAM VERIFICATION (COMPUTERS)

Verification of Software: The Textbook and Real Problems – 156

PROJECT MANAGEMENT

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

PROPELLANTS

High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23

Hydrogen Reduction of Ilmenite from Lunar Regolith – 35

Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17

PROPULSION SYSTEM CONFIGURATIONS

High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23

Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177

Review of Laser Lightcraft Propulsion System (Preprint) – 16

PROPULSION SYSTEM PERFORMANCE

Fast Track for a Slower Rocket Engine – 24

Review of Laser Lightcraft Propulsion System (Preprint) – 16

PROPULSION

High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23

PROSTATE GLAND

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100

Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer – 100

Molecular and Clinical Predictors of Aggressive Prostate Cancer – 91

New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling – 100

Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – 96

PROTEASE

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 99

PROTECTION

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Canula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

PROTECTIVE COATINGS

Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7

Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26

PROTEINS

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 99

Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101

Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

Space Medicine and Medical Engineering, Volume 20, No. 4 – 105

The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99

PROTOCOL (COMPUTERS)

A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40

PROTON ENERGY

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

PROTONS

Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81

PROTOTYPES

Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154

PROVING

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

Verification of Software: The Textbook and Real Problems – 156

PSYCHIATRY

Human Dimensions in Military Operations-Military Leaders' Strategies for Addressing Stress and Psychological Support – 125

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Risk, Psychiatry and the Modern Military – 132

PSYCHOLOGICAL EFFECTS

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

PSYCHOLOGICAL FACTORS

Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129

French Army - Family Psychological and Social Support – 144

Global Deployment of Reserve Soldiers: A Leadership Challenge – 130

Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136

How to TRIM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Military Leader's Role in Psychological Support during Deployment – 137

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143

PSYCHOLOGY

Analysis and Comparative Study on Characteristics of Competent Astronauts – 117

Military Leader Perspectives of Psychological Fitness – 129

Morale as a Protection Factor against Mission Related Stress – 135

Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport – 141

PSYCHOMETRICS

The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143

PSYCHOPHYSIOLOGY

Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124

PUBLIC HEALTH

Risk, Psychiatry and the Modern Military – 132

Spring 2006. Industry Study. Health Care Industry – 93

PULMONARY FUNCTIONS

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

PULSE COMMUNICATION

Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47

PULSE DETONATION ENGINES

Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31

Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26

PULSE GENERATORS

Hybrid Power Management System and Method – 64

PUPILS

An Analysis of Relation between Changes of Pupil and Mental Workloads – 119

PYROXENES

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

QUADRANTS

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – 184

QUALITY CONTROL

An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46

QUANTITATIVE ANALYSIS

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28

QUANTUM COMPUTATION

Quantum Computing Using Superconducting Qubits – 175

QUANTUM OPTICS

Quantum Optics Initiative – 73

QUANTUM THEORY

The Role of Frame Force in Quantum Detection – 167

QUANTUM WELLS

Conversion of type of quantum well structure – 61

Conversion of Type of Quantum Well Structure – 64

RADAR CORNER REFLECTORS

Polarimetric Interferometry - Target Detection Applications – 55

RADAR DATA

Fundamentals of Knowledge-Based Techniques – 54

Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52

Introduction to Radar Signal and Data Processing: The Opportunity – 51

RADAR DETECTION

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

Knowledge-Based Radar Signal and Data Processing – 50

Polarimetric Interferometry - Target Detection Applications – 55

RADAR ECHOES

Application of Knowledge-Based Techniques to Tracking Function – 54

RADAR IMAGERY

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

RADAR MEASUREMENT

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Expert System Constant False Alarm Rate (CFAR) Processor – 53

RADAR SCATTERING

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

RADARSAT

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

RADAR

A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

Polarimetric Detection of Targets in Inhomogeneous Clutter – 72

RADIANCE

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78

Method and program product for determining a radiance field in an optical environment – 175

RADIATION DAMAGE

Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118

RADIATION DOSAGE

Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118

RADIATION EFFECTS

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102

RADIATION PROTECTION

Evaluations of Risks from the Lunar and Mars Radiation Environments – 197

Science Goals in Radiation Protection for Exploration – 197

RADIATIVE TRANSFER

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78

Method and program product for determining a radiance field in an optical environment – 175

RADIO FREQUENCIES

Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4

RADIO FREQUENCY INTERFERENCE

Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4

RADIO RELAY SYSTEMS

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

RADIOACTIVE AGE DETERMINATION

Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 190

RADIOACTIVITY

GCR-Induced Photon Luminescence of the Moon – 191

RADIOBIOLOGY

Science Goals in Radiation Protection for Exploration – 198

RADIOMETERS

Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 87

RANGEFINDING

New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79

RARE GASES

A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Triogenic Helium-3 – 30

Are Fullerenes Relevant to Cosmochemistry? A New Finding – 178

RATINGS

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13

REACTANCE

Enhancing Mental Readiness in Military Personnel – 132

REACTING FLOW

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27

REACTION KINETICS

Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27

Kinetics of Reaction between LiOH - H₂O and CO₂ – 119

REAL TIME OPERATION

A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 117

Data-Driven Robust Control Design: Unfalsified Control – 151

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87

Thin, nearly wireless adaptive optical device – 69

RECEPTORS (PHYSIOLOGY)

Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91

RECOMMENDATIONS

Generation Y Perspectives – 177

RECURSIVE FUNCTIONS

Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer – 167

REFRACTIVITY

Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – 29

Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173

REFRACTORIES

Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 100

REGRESSION ANALYSIS

Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41

REGULATORY MECHANISMS (BIOLOGY)

Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113

REINFORCING MATERIALS

Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25

RELATIVE BIOLOGICAL EFFECTIVENESS (RBE)

Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124

RELIABILITY

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164

REMOTE SENSING

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 80

Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 22

Polarimetric Interferometry - Remote Sensing Applications – 58

Radar Polarimetry and Interferometry – 54

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

The Crew Earth Observations Experiment: Earth System Science from the ISS – 79

REMOTELY PILOTED VEHICLES

Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8

RENEWABLE ENERGY

Energy Industry, 2006 – 68

REQUIREMENTS

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 149

SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153

RESEARCH AIRCRAFT

Autonomous Formation Flight: Project Overview – 1

RESEARCH AND DEVELOPMENT

Human Research Program Requirements Document – 115

NRL Review, 2004 – 43

The Need for a USAF UAV Center of Excellence – 9

RESEARCH MANAGEMENT

The Aircraft Industry, 2006 – 10

RESEARCH

Development of an Aeromedical Scientific Information System for Aviation Safety – 3

Eastern European Science Needs Sweeping Changes – 89

RESIDUAL STRESS

An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33

RESISTOJET ENGINES

Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17

RESPIRATION

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

RESPIRATORY RATE

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

RESPIRATORY SYSTEM

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

REVERBERATION

Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420 – 162

RHEOLOGY

Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle – 80

RHYTHM (BIOLOGY)

Estimation of Percentage of Electrogas-trogram Slow Wave Rhythm – 89

RIBONUCLEIC ACIDS

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100

Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91

RIGID STRUCTURES

A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37

Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41

RISK

Early Design Choices: Capture, Model, Integrate, Analyze, Simulate – 171

Evaluations of Risks from the Lunar and Mars Radiation Environments – 197

How to TRIM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

Risk, Psychiatry and the Modern Military – 132

Risks Associated with Long-Term Spaceflight – 112

Space Radiation Program Element – 113

The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114

Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140

ROBOT ARMS

Quantitative Robust Control Engineering: Theory and Applications – 151

ROBOTICS

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

Layered Augmented Virtuality – 165

Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13

Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164

ROBOTS

Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots – 163

Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

ROBUSTNESS (MATHEMATICS)

Advanced Control Law Tuning and Performance Assessment – 152

An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105

Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots – 163

Quantitative Robust Control Engineering: Theory and Applications – 151

ROCKET PROPELLANTS

Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36

ROCKS

Acid Vapor Weathering of Apatite and Implications for Mars – 86

ROLL

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

ROTATION

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

ROVING VEHICLES

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhlite M103346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 84

RUBBER

Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35

RUBIDIUM

Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174

RUPTURING

Process for self-repair of insulation material – 33

S MATRIX THEORY

Basics of SAR Polarimetry II – 57

Basics of SAR Polarimetry I – 58

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

SAFETY DEVICES

Cushion System for Multi-Use Child Safety Seat – 75

SAFETY

Cushion system for multi-use child safety seat – 37

Early Design Choices: Capture, Model, Integrate, Analyze, Simulate – 171

SAMPLE RETURN MISSIONS

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

- STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18
- SAMPLING**
Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 81
- SAN FRANCISCO BAY (CA)**
TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161
- SATELLITE COMMUNICATION**
2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19
- SATELLITE IMAGERY**
CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17
The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – 17
- SATELLITE INSTRUMENTS**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 23
- SATELLITE OBSERVATION**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 23
- SATELLITE-BORNE PHOTOGRAPHY**
The Crew Earth Observations Experiment: Earth System Science from the ISS – 79
The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – 17
- SATELLITES**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 14
- SCALE MODELS**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- SCANNING ELECTRON MICROSCOPY**
Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77
- SCATTERING**
Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166
- SCIENCE**
Eastern European Science Needs Sweeping Changes – 89
- SEALS (STOPPERS)**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- SEAMOUNTS**
Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166
- SEAS**
Sea Clutter Generation and Target Detection – 171
Waveform-Agile Tracking In Heavy Sea Clutter – 72
- SEATS**
Cushion system for multi-use child safety seat – 37
Cushion System for Multi-Use Child Safety Seat – 74
- SECURITY**
Data Mining and Homeland Security: An Overview – 179
Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport – 141
Quantum Optics Initiative – 73
- SEDATIVES**
Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4
- SEDIMENT TRANSPORT**
Coastal Sediment Transport Models and Mixed Particle Size Dynamics – 164
- SEDIMENTARY ROCKS**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- SEDIMENTS**
An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 106
- SEGMENTS**
A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105
- SELECTION**
Verification of Software: The Textbook and Real Problems – 156
- SELENIUM**
New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling – 101
- SELF REPAIRING DEVICES**
Process for Self-Repair of Insulation Material – 25
- SEMICONDUCTOR DEVICES**
Interband cascade detectors – 176
- SEMICONDUCTORS (MATERIALS)**
Conversion of type of quantum well structure – 61
Conversion of Type of Quantum Well Structure – 64
Electronics Industry – 65
Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173
- SENSITIVITY**
A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123
- SENSITIZING**
Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 31
- SENSORS**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 175
Method and apparatus for loss of control inhibitor systems – 11
Network device interface for digitally interfacing data channels to a controller via a network – 160
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- SENSORY FEEDBACK**
Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142
- SEQUENCING**
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
- SEQUENTIAL ANALYSIS**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- SEQUENTIAL CONTROL**
Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152
- SERUMS**
Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93
- SET THEORY**
Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 180
- SEWAGE**
An Optimization Model of Sewage Rehabilitation – 38

SHALLOW WATER

Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420 – 162

SHAPE MEMORY ALLOYS

Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32

SHAPE OPTIMIZATION

Modeling and Optimization for Morphing Wing Concept Generation II – 6

Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6

SHAPES

Modeling and Optimization for Morphing Wing Concept Generation II – 6

Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6

Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

SHEAR LAYERS

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27

SHEAR STRESS

Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107

Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118

Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107

SHEARING

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

SHERGOTTITES

Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 190

Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

SHIPYARDS

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155

SHOCK WAVE ATTENUATION

Quiet Spike: Softening the Sonic Boom – 9

SHUTTLE IMAGING RADAR

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Polarimetric Interferometry – 56

SIDEROPHILE ELEMENTS

Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192

SIGNAL ANALYZERS

Expert System Constant False Alarm Rate (CFAR) Processor – 53

SIGNAL PROCESSING

A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152

Correlation Based Testing for Passive Sonar Picture Rationalization – 165

Expert System Constant False Alarm Rate (CFAR) Processor – 53

Fundamentals of Knowledge-Based Techniques – 54

Introduction to Radar Signal and Data Processing: The Opportunity – 51

Knowledge-Based Radar Signal and Data Processing – 50

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

SIGNAL TRANSMISSION

Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46

SIGNALS

Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90

SIGNS AND SYMPTOMS

Battlemind Training: Building Soldier Resiliency – 138

Morale as a Protection Factor against Mission Related Stress – 135

SILICA GLASS

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78

SILICATES

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191

Containerless Processing of a Lithium Disilicate Glass – 24

In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78

Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78

SILICIDES

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 188

SILICON CARBIDES

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbide Target 60001 – 184

SILICON DIOXIDE

Containerless Processing of a Lithium Disilicate Glass – 24

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

SILICON

Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29

SILVER

Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers – 67

SIMPLIFICATION

A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38

SIMULATION

A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190

Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91

Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27

Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158

NASA Constellation Distributed Simulation Middleware Trade Study – 161

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

RAP Simulation Environment Characteristics – 153

Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68

SIMULATORS

Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 4

SINGLE CRYSTALS

Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35

Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 31

SINGULARITY (MATHEMATICS)

Evaluating the Gradient of the Thin Wire Kernel – 167

SITUATIONAL AWARENESS

RAP Simulation Environment Characteristics – 154

SIZE DISTRIBUTION

Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47

SLEEVES

Friction stir weld tools – 74

SNC METEORITES

Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhlite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 84

SOCIAL FACTORS

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126

SOFTWARE DEVELOPMENT TOOLS

A Toolkit for Building Hybrid, Multi-Resolution PMESII Models – 159

AIMSsim Version 2.2.1, User Manual – 157

Herc SAR Task 106: AIMS Feature Development – 156

LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154

Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154

SOFTWARE ENGINEERING

Capability Maturity Model (Trademark) Integration (CMMI (Service Mark)), Version 1.1. CMMI (Service Mark) for Software Engineering (CMMI-SW, V1.1) – 156

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153

SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153

SOFTWARE RELIABILITY

JBoss Middleware for Spacecraft Trajectory Operations – 160

SOIL SAMPLING

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

SOIL SCIENCE

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

SOILS

Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

SOLAR CORPUSCULAR RADIATION

Evaluations of Risks from the Lunar and Mars Radiation Environments – 197

SOLAR NEBULA

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

SOLAR RADIATION

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185

SOLAR WIND

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – 184

SOLID PROPELLANT ROCKET ENGINES

The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 16

SOLID STATE

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

SOLIDS

Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34

SOLVENTS

Catalytic dehydrogenation of amine borane complexes – 27

SONAR

Correlation Based Testing for Passive Sonar Picture Rationalization – 166

Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173

Marine Mammals and Active Sonar – 172

Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420 – 162

Sonar 3 VMSA Federate: User Guide and Technical Description – 157

Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172

SONIC BOOMS

Quiet Spike: Softening the Sonic Boom – 9

SOUNDS (TOPOGRAPHIC FEATURES)

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155

SPACE CAPSULES

Reconstruction of the Genesis Entry – 21

SPACE DEBRIS

Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 14

STS-118 Radiator Impact Damage – 21

SPACE EXPLORATION

An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190

Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

Science Goals in Radiation Protection for Exploration – 197

The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 15

The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196

SPACE FLIGHT FEEDING

Effect of Processing and Subsequent Storage on Nutrition – 103

SPACE FLIGHT STRESS

Human Research Program Requirements Document – 115

SPACE FLIGHT

Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114

Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

Life Sciences Data Archive (LSDA) – 103

Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

Validation of Procedures for Monitoring Crewmember Immune Function – 109

SPACE MISSIONS

Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113

In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – 195

SPACE PERCEPTION

Naive Realism in Terrain Appreciation – 169

SPACE PROGRAMS

Generation Y Perspectives – 177

Shuttle to Orion: First Steps Back to Orbit – 18

SPACE SHUTTLE BOOSTERS

The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 16

SPACE SHUTTLE MISSIONS

Human Factors in Training – 110

SPACE SHUTTLE ORBITERS

STS-118 Radiator Impact Damage – 22

SPACE SHUTTLES

International Space Station Medical Project – 113

STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18

The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

SPACE STATION PAYLOADS

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147

SPACE STATION POWER SUPPLIES

A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148

SPACE SUITS

The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

SPACE SURVEILLANCE (SPACEBORNE)

2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19

SPACE TRANSPORTATION SYSTEM FLIGHTS

Shuttle to Orion: First Steps Back to Orbit – 18

SPACE TRANSPORTATION SYSTEM

STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 19

STS-118 Radiator Impact Damage – 21

SPACE TRANSPORTATION

Methods and Systems for Advanced Spaceport Information Management – 15

SPACE WEATHER

Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185

SPACECRAFT DESIGN

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 20

SPACECRAFT ENVIRONMENTS

Spacecraft Internal Acoustic Environment Modeling – 172

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19

SPACECRAFT LAUNCHING

Shuttle to Orion: First Steps Back to Orbit – 18

SPACECRAFT PROPULSION

Fast Track for a Slower Rocket Engine – 24

SPACECRAFT REENTRY

Reconstruction of the Genesis Entry – 21

SPACECRAFT STRUCTURES

Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 14

SPACECRAFT TRAJECTORIES

JBoss Middleware for Spacecraft Trajectory Operations – 160

Reconstruction of the Genesis Entry – 21

SPACECREWS

Human Crews Flight – 186

The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114

Validation of Procedures for Monitoring Crewmember Immune Function – 109

SPACE-TIME ADAPTIVE PROCESSING

Knowledge-Based Control for Space Time Adaptive Processing – 53

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

SPATIAL FILTERING

Naive Realism in Terrain Appreciation – 169

SPECIFICATIONS

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

SPECTRA

Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166

SPECTROGRAMS

A Novel Detector of Broadband Transient Signals – 73

SPECTROSCOPY

Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174

MURI Center for Multidimensional Surface-Enhanced Sensing and Spectroscopy – 173

Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70

SPHERES

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

SPIKES (AERODYNAMIC CONFIGURATIONS)

Quiet Spike: Softening the Sonic Boom – 9

SPINE

Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116

SPRINGS (WATER)

Ancient Hydrothermal Springs in Arabia Terra, Mars – 196

SPUTNIK SATELLITES

Sputnik and the Dawn of the Space Age – 198

STABILITY

Genomic Instability and Breast Cancer – 97

STANDARDS

Human Factors Engineering Standards at NASA – 148

STARDUST MISSION

Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33

Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188

STATISTICAL CORRELATION

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

STEELS

Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31

STELLAR ENVELOPES

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

STEM CELLS

Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120

Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101

STEREOSCOPY

Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193

STERILIZATION

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

STIFFNESS

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

STIMULATION

Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 103

STIRLING ENGINES

Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section – 75

STOMACH

Estimation of Percentage of Electrogastrogram Slow Wave Rhythm – 89

STORAGE STABILITY

Effect of Processing and Subsequent Storage on Nutrition – 103

STORMS

Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003 – 87

STOVL AIRCRAFT

Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12

STRATIGRAPHY

Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191

STREAMS

Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44

STRESS ANALYSIS

Enhancing Mental Readiness in Military Personnel – 132

Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134

Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133

Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142

Stress Analysis and Fracture in Nanolaminate Composites – 26

Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141

Stress Training and the New Military Environment – 142

Virtual Reality as a Tool in Early Interventions – 128

STRESS CONCENTRATION

Stress Analysis and Fracture in Nanolaminate Composites – 26

STRESS MEASUREMENT

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75

STRESS (PHYSIOLOGY)

How to TRIM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133

STRESS (PSYCHOLOGY)

Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 131

Morale as a Protection Factor against Mission Related Stress – 135

Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

STRESS-STRAIN RELATIONSHIPS

Equipment and Testing Procedures for Small Strain Triaxial Tests – 41

STRUCTURAL ANALYSIS

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

STRUCTURAL BASINS

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

STRUCTURAL DESIGN

Modeling and Optimization for Morphing Wing Concept Generation II – 6

Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6

STRUCTURAL ENGINEERING

Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28

Time Delay H(infinity) Control of Structures under Earthquake Loading – 44

STRUCTURAL FAILURE

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 67

STRUCTURAL PROPERTIES (GEOLOGY)

The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83

STUDENTS

Veterinary Research Manpower Development for Defense – 102

SUBLIMATION

Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190

SUBSTRATES

Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62

Increased alignment in carbon nanotube growth – 61

SULFATES

Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

SULFUR

Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190

SUPERCONDUCTIVITY

Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74

Quantum Computing Using Superconducting Qubits – 174

SUPPORT SYSTEMS

Close Air Support Command and Control at the Operational Level – 50

Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131

Deployment Support - Strength through Partnership – 138

Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129

Family Support in the German Armed Forces – 139

French Army - Family Psychological and Social Support – 144

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134

Military Leader's Role in Psychological Support during Deployment – 137

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153

Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135

Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126

The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129

The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136

The Navy's Support to Sailors in Operations and their Families in France – 134

SURFACE GEOMETRY

Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 10

SURFACE PROPERTIES

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78

Functionalization of carbon nanotubes – 62

Lunar Dust and Lunar Simulant Activation and Monitoring – 193

SURFACE TEMPERATURE

Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78

Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – 70

SURFACE VEHICLES

Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166

SURFACTANTS

Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90

SURGERY

Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90

SURGES

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87

SURGICAL INSTRUMENTS

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

SURVEILLANCE

AIMSsim Version 2.2.1, User Manual – 157

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extradwideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 60

Expert System Constant False Alarm Rate (CFAR) Processor – 53

Herc SAR Task 106: AIMS Feature Development – 156

Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

SURVEYS

An International Survey of Maintenance Human Factors Programs – 8

Development and Results of CORA DWAN Website Survey – 184

Survey of Event Processing – 183

The Navy's Support to Sailors in Operations and their Families in France – 134

SURVIVAL

5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100

SUSPENSIONS

Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63

SWELLING

Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35

SWITCHES

Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67

SWITCHING

Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149

Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162

SYNCHROTRON RADIATION

Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 189

SYNTHESIS (CHEMISTRY)

Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90

SYNTHETIC APERTURE RADAR

Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extradwideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 60

Basics of SAR Polarimetry II – 57

Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Normal and Differential SAR Interferometry – 58

Polarimetric Interferometry – 56

Radar Polarimetry and Interferometry – 54

Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

SYNTHETIC APERTURES

Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 65

SYSTEM EFFECTIVENESS

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Canula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 146

Enhancing Mental Readiness in Military Personnel – 131

PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137

Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13

SYSTEM FAILURES

Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 20

SYSTEMS ANALYSIS

Collaborative Mission Design at NASA Langley Research Center – 169

Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180

Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40

SYSTEMS ENGINEERING

Collaborative Mission Design at NASA Langley Research Center – 169

Embedded Control System Design and Practice: An Example by a FCU Controller – 45

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196

Functionalization of Carbon Nanotubes – 176

Information Presentation – 146

Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177

JBoss Middleware for Spacecraft Trajectory Operations – 160

Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177

NEXT Ion Propulsion System Development Status and Performance – 23

Population Analysis: Communicating in Context – 147

Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147

SYSTEMS INTEGRATION

Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II – 150

Derivation of Boundary Manikins: A Principal Component Analysis – 146

Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Canula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 145

Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196

Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 148

Human Factors Engineering Standards at NASA – 147

Human Factors in Human-Systems Integration – 150

NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195

NEXT Ion Propulsion System Development Status and Performance – 23

Test and Verification Approach for the NASA Constellation Program – 11

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13

SYSTEMS MANAGEMENT

Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 178

Methods and Systems for Advanced Spaceport Information Management – 15

TAIWAN

Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49

TARGET ACQUISITION

Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 180

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

Polarimetric Detection of Targets in Inhomogeneous Clutter – 72

Polarimetric Interferometry - Target Detection Applications – 55

Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71

Sea Clutter Generation and Target Detection – 171

TARGET MASKING

Application of Knowledge-Based Techniques to Tracking Function – 54

TARGET RECOGNITION

Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59

TARGETS

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179

Information Theoretic Radar Waveform Design for Multiple Targets – 164

Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52

Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420 – 162

Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92

Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71

Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbide Target 60001 – 184

Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer – 167

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96

Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98

TECHNOLOGY ASSESSMENT

Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 2

Knowledge-Based Radar Signal and Data Processing – 50

News Media Industry – 180

Planetary Protection Provisions for Mars: Forward and Back Considerations – 14

Space Industry – 16

TECHNOLOGY UTILIZATION

Conversations with Rebecca Spyke Keiser. Interview by Frank Sietzen – 185

Current Issues in Human Spacecraft Thermal Control Technology – 192

Mission Medical Information System – 115

- NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – [194](#)
- NRL Review, 2004 – [43](#)
- The Aircraft Industry, 2006 – [10](#)
- TECTONICS**
- Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – [80](#)
- The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – [83](#)
- TELECOMMUNICATION**
- Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – [37](#)
- Low Complexity Convolutional Codes of Rate 2/N – [38](#)
- The American Military and the Media: Historical Lessons and Future Considerations – [181](#)
- TELEMEDICINE**
- Virtual Reality as a Tool in Early Interventions – [128](#)
- TELEMETRY**
- Anomalistic Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – [193](#)
- Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – [106](#)
- TELEVISION SYSTEMS**
- News Media Industry – [181](#)
- TEMPERATURE CONTROL**
- Current Issues in Human Spacecraft Thermal Control Technology – [193](#)
- Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – [95](#)
- STS-118 Radiator Impact Damage – [21](#)
- Thermal modulation for gas chromatography – [62](#)
- TEMPERATURE DEPENDENCE**
- Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – [29](#)
- TEMPERATURE DISTRIBUTION**
- Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – [86](#)
- TEMPERATURE MEASUREMENT**
- Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – [70](#)
- TERMINAL BALLISTICS**
- Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – [34](#)
- TERMINAL FACILITIES**
- Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – [13](#)
- TERRAIN**
- Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – [186](#)
- Naive Realism in Terrain Appreciation – [169](#)
- Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – [189](#)
- TERRESTRIAL PLANETS**
- Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – [192](#)
- TEST CHAMBERS**
- Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section – [75](#)
- TEST FACILITIES**
- Project VANGUARD Report No. 2, Report of Progress – [14](#)
- TEXTS**
- My Father is a Soldier - A Children's Book – [133](#)
- THERAPY**
- Guideline for Early Interventions – [142](#)
- Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – [98](#)
- Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – [96](#)
- The Navy's Support to Sailors in Operations and their Families in France – [134](#)
- Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – [101](#)
- Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – [93](#)
- Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – [96](#)
- Virtual Reality as a Tool in Early Interventions – [128](#)
- THERMAL CONDUCTIVITY**
- Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – [25](#)
- Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – [74](#)
- THERMAL CONTROL COATINGS**
- Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – [26](#)
- THERMAL EMISSION**
- The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – [84](#)
- THERMAL ENERGY**
- Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – [67](#)
- THERMAL MAPPING**
- Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – [70](#)
- THERMAL STABILITY**
- Thermostable Shelf Life Study – [103](#)
- THERMOCHEMISTRY**
- Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – [28](#)
- THERMOELECTRICITY**
- Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – [67](#)
- Patterning of Bi2Te3 Polycrystalline Thin-Films on Silicon – [29](#)
- THERMOGRAPHY**
- Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – [70](#)
- THERMOPLASTICITY**
- Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – [35](#)
- THERMOREGULATION**
- Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – [95](#)
- THIN FILMS**
- Patterning of Bi2Te3 Polycrystalline Thin-Films on Silicon – [29](#)
- THIN WALLS**
- Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – [41](#)
- THREE DIMENSIONAL MODELS**
- A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – [38](#)
- THROTTLING**
- Fast Track for a Slower Rocket Engine – [24](#)
- THRUST CONTROL**
- Fast Track for a Slower Rocket Engine – [24](#)
- TIME LAG**
- Time Delay H(infinity) Control of Structures under Earthquake Loading – [45](#)

TIME MEASUREMENT

Duration of a Magma Ocean and Subsequent Mantle Overtum in Mars: Evidence from Nakhilites – 190

TIME SERIES ANALYSIS

A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94

Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13

Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157

TIMING DEVICES

Gambling Task (fMRI Revision 3.0.1) – 170

TISSUE ENGINEERING

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121

TOMOGRAPHY

Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101

TOOLS

Friction Stir Weld Tools – 75

TOPOLOGY

TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161

Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2

TORQUE

Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193

TOXICITY

Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95

Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104

TOXICOLOGY

Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 105

STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18

TOXINS AND ANTITOXINS

Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 98

TRACE ELEMENTS

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188

TRACKING (POSITION)

Application of Knowledge-Based Techniques to Tracking Function – 54

Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52

Introduction to Radar Signal and Data Processing: The Opportunity – 51

Knowledge-Based Solutions as They Apply to the General Radar Problem – 51

TRACKING RADAR

Impact of Knowledge-Based Techniques on Emerging Technologies – 52

TRAFFIC

Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 5

TRAJECTORIES

3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71

Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39

Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86

TRAJECTORY ANALYSIS

JBoss Middleware for Spacecraft Trajectory Operations – 160

TRAJECTORY PLANNING

JBoss Middleware for Spacecraft Trajectory Operations – 160

TRANSFER FUNCTIONS

Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 48

Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101

TRANSFORMATIONS (MATHEMATICS)

Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46

TRANSMISSION LINES

Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68

TRANS-NEPTUNIAN OBJECTS

Collisional Processing of Olivine and Pyroxene in Cometary Dust – 187

TRANSPORTER

Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 67

TRIANGLES

A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38

TRIBOLOGY

Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75

TROPICAL STORMS

Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87

TROPOSPHERE

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88

TUBE CATHODES

Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66

TUMORS

Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis – 99

Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93

TUNABLE LASERS

A High Power Frequency Doubled Fiber Laser – 73

TUNGSTEN

L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78

TUNING

Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II – 150

Advanced Control Law Tuning and Performance Assessment – 151

TURBINE BLADES

Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10

TURBINES

Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 32

Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10

TWO DIMENSIONAL MODELS

Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48

ULTRAHIGH FREQUENCIES

Polarimetric Interferometry - Remote Sensing Applications – 58

ULTRASONICS

Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 122

Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115

UNCERTAIN SYSTEMS

A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 44

Achieving Successful Robust Integrated Control System Designs for 21st Century Military Applications Part II – 150

Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43

UNDERWATER ACOUSTICS

Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173

UNITED STATES

Electronics Industry – 65

Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 98

Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88

Space Industry – 16

UNIVERSITY PROGRAM

CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17

UNMANNED AIRCRAFT SYSTEMS

Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5

UNMANNED GROUND VEHICLES

Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164

Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164

UREILITES

Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

URINE

An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 106

USER MANUALS (COMPUTER PROGRAMS)

AIMSsim Version 2.2.1, User Manual – 157

USER REQUIREMENTS

Development and Results of CORA DWAN Website Survey – 184

VACCINES

Evaluation of Listeria Monocytogenes Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97

VACUUM

Multiple internal seal right micro-electro-mechanical system vacuum package – 62

VAPOR DEPOSITION

Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77

VAPOR PHASES

The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 21

VAPORS

Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47

VARIABLE SWEEP WINGS

Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2

VARIABLE THRUST

Fast Track for a Slower Rocket Engine – 24

VECTOR ANALYSIS

Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181

VEINS

Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107

VENTILATION FANS

Embedded Control System Design and Practice: An Example by a FCU Controller – 45

VENTILATION

Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47

VERTICAL DISTRIBUTION

Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 81

VESTA ASTEROID

K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83

Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85

VESTIBULES

Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 111

VETERINARY MEDICINE

Veterinary Research Manpower Development for Defense – 102

VIBRATION EFFECTS

Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107

VIDEO COMMUNICATION

An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46

VIDEO EQUIPMENT

Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – 70

VIRTUAL REALITY

Virtual Reality as a Tool in Early Interventions – 128

VIRUSES

Incidence of Latent Virus Shedding during Space Flight – 112

VISCOELASTICITY

Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106

VISUAL AIDS

Information Complexity in Air Traffic Control Displays – 182

VOLCANOES

Polarimetry and Interferometry Applications – 55

VOLCANOLOGY

An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191

VORTICES

Autonomous Formation Flight: Project Overview – 1

Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5

VULCANIZING

Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 35

WALKING

Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots – 163

WAR GAMES

Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165

WARFARE

A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155

An Operator Perspective on Net-Centric Underwater Warfare – 50

- Basic and Operational Doctrine for Airpower in Irregular Warfare – 18
- Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132
- The Mental Health Needs Assessment – 126
- WASTE WATER**
An Optimization Model of Sewage Rehabilitation – 38
- WATER DEPTH**
Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174
- WATER TREATMENT**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
- WATER**
Lunar Outpost Technologies Breakeven Study – 145
- Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- WAVE EQUATIONS**
Basics of SAR Polarimetry II – 57
- WAVE FRONTS**
An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- WAVE PROPAGATION**
Polarimetric Interferometry - Target Detection Applications – 55
- WAVE SCATTERING**
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Polarimetric Interferometry - Remote Sensing Applications – 58
- The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48
- WAVEFORMS**
Information Theoretic Radar Waveform Design for Multiple Targets – 165
- Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 45
- Waveform-Agile Tracking In Heavy Sea Clutter – 72
- WAVEGUIDES**
Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173
- Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- WAXES**
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- WEAPONS**
The 2009 Version of the Aeroprediction Code: The AP09 – 2
- WEAR RESISTANCE**
Process for self-repair of insulation material – 33
- WEATHERING**
Acid Vapor Weathering of Apatite and Implications for Mars – 86
- WEATHER**
Evaluation and Application of the Weather Research and Forecast Model – 88
- WEB SERVICES**
Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39
- Fuselet Workflow Inspection and Feedback – 183
- WEBSITES**
Development and Results of CORA DWAN Website Survey – 184
- WEIBULL DENSITY FUNCTIONS**
Knowledge-Based Solutions as They Apply to the General Radar Problem – 51
- WEIGHTLESSNESS SIMULATION**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 119
- WEIGHTLESSNESS**
Foot Reaction Forces during Long Duration Space Flight – 109
- Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120
- WELDED JOINTS**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- WELDING**
Friction Stir Weld Tools – 75
- WILD 2 COMET**
Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 189
- WIND DIRECTION**
Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- WIND TUNNEL TESTS**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- WING PLANFORMS**
Modeling and Optimization for Morphing Wing Concept Generation II – 6
- Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- WING PROFILES**
Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- WINGS**
Modeling and Optimization for Morphing Wing Concept Generation II – 6
- Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- WIRELESS COMMUNICATION**
Wireless Cooperative Networks: Self-Configuration and Optimization – 66
- Wireless Instrumentation System and Power Management Scheme Therefore – 64
- WIRE**
Evaluating the Gradient of the Thin Wire Kernel – 167
- WORDS (LANGUAGE)**
Commander - Unit Psychologist: A Powerful Tandem – 137
- WORKLOADS (PSYCHOPHYSIOLOGY)**
Leader Actions to Enhance Soldier Resiliency in Combat – 140
- X RAY DIFFRACTION**
Synchrotron X-Ray Diffraction Studies of Olivine from Comet Wild 2 – 189
- X RAY FLUORESCENCE**
GCR-Induced Photon Luminescence of the Moon – 191
- X RAY SPECTRA**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
- X RAY SPECTROMETERS**
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- X RAY SPECTROSCOPY**
Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77
- YAW**
Autonomous Formation Flight: Project Overview – 1
- YOUTH**
Generation Y Perspectives – 177

Personal Author Index

- Aceto, Paul**
News Media Industry – 180
- Acuff, K. M.**
Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78
- Adamo, Daniel**
3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71
- Adelstein, B. D.**
Information Presentation – 146
- Adler, Amy B.**
Leader Actions to Enhance Soldier Resiliency in Combat – 140
- Adler, Amy**
Military Leader Perspectives of Psychological Fitness – 129
The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- Adolfson, David**
Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section – 75
- Aggarwal, Barat B.**
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Aggarwal, Mohan D.**
Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- Agresti, D. G.**
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
- A'Harrah, Ralph C.**
Method and apparatus for loss of control inhibitor systems – 11
- Ahmed, Rajib**
Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- Ahuja, G**
Layered Augmented Virtuality – 165
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- Akella, Ram**
Data Mining SIAM Presentation – 161
- Albanese, Richard A**
Mathematical Approach to the Evaluation and Planning of Influence Operations – 168
- Alexander, Millard H**
Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 28
- Alferova, I. V.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Allahar, Brian**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Allen, B. Danette**
Collaborative Mission Design at NASA Langley Research Center – 168
- Allen, C. C.**
Curation of Frozen Samples – 184
- Allen, Carlton C.**
Ancient Hydrothermal Springs in Arabia Terra, Mars – 195
- Allen, Christopher**
Spacecraft Internal Acoustic Environment Modeling – 172
- Allen, John S**
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163
- Allouche, Mohamad**
RAP Simulation Environment Characteristics – 153
- Allton, J. H.**
Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77
Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – 184
Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193
- Alred, John**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19
- Amundsen, Ruth M.**
Collaborative Mission Design at NASA Langley Research Center – 168
- Anderson, Martha**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 22
- Andres, M.**
Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126
- Andrews-Hanna, J. C.**
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- Anselmo, Estelle**
High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- Antonini, D. K.**
Thermostable Shelf Life Study – 103
- Antonini, David**
Comparative Packaging Study – 36
- Anwer, M S**
Veterinary Research Manpower Development for Defense – 102
- Ao, Chi O.**
Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- Arkoudas, Konstantine**
Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165
- Arrieta, Richard**
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- Arsintescu, Lucia**
Human Factors in Training – 110
- Arvers, P.**
Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 130
The Navy's Support to Sailors in Operations and their Families in France – 134
- Arvidson, E.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Arvidson, R. E.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186

- Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Arvidson, R.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Arvrs, Philippe**
The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- Aveline, Dave**
A High Power Frequency Doubled Fiber Laser – 73
- Avidson, R. E.**
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- Azimi, Ali**
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Bachman, John A**
A Toolkit for Building Hybrid, Multi-Resolution PMESII Models – 158
- Bae, Youngsam**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- Baez, Marivell**
Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- Bagnati, Dave**
News Media Industry – 180
- Bai, Jing**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Bai, Yan-qiang**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Bailey, Marianne**
Space Industry – 16
- Baird, Robert**
Fuselet Workflow Inspection and Feedback – 183
- Baldygo, William J., Jr.**
Expert System Constant False Alarm Rate (CFAR) Processor – 53
- Banks, Bruce A.**
Energetic Atomic and Ionic Oxygen Textured Optical Surfaces for Blood Glucose Monitoring – 175
- Barengoltz, Jack**
The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- Barlow, Carolee**
Neuropathy Target Esterase in Brain Function and Deterioration Caused by Cholinesterase Inhibiting Chemicals – 92
- Barr, Abbe**
Derivation of Boundary Manikins: A Principal Component Analysis – 146
- Barrera, Aaron**
Generation Y Perspectives – 176
- Barshi, Immanuel**
Human Factors in Training – 110
- Bastian, R.**
Curation of Frozen Samples – 184
- Bastrzyk, Marta B.**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Bates, Cristina**
An International Survey of Maintenance Human Factors Programs – 8
- Bathalon, Gaston P.**
Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127
- Bauer, A M**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Begault, D. R.**
Information Presentation – 146
- Beidleman, Beth A**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- Belanger, Micheline**
RAP Simulation Environment Characteristics – 153
- Bell, Robert**
Electronics Industry – 65
- Benedetto, John J**
The Role of Frame Force in Quantum Detection – 167
- Benoit-Bird, Kelly J**
A Novel Technique to Detect Epipelagic Fish Populations and Map Their Habitat – 80
Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28
- Benson, Elizabeth A.**
Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 148
- Benson, Scott W.**
NEXT Ion Propulsion System Development Status and Performance – 23
- Berger, Cristina M.**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Berger, Jason**
Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 1
- Berthet, S.**
Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192
- Beutter, B. R.**
Information Presentation – 146
- Bevilacqua, Vicky L H**
Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95
- Bi, Hong-zhe**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Bibring, J.-P.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Biddlecombe, Kathleen D**
Space Industry – 16
- Bierwagen, Gordon**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Billings, Deborah R**
Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170
- Birchenough, Arthur**
Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68
- Birsan, Marius**
Recursive Bayesian Method for Tracking a Magnetic Target with a Gradiometer – 167
- Birtles, Catherine**
Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131
- Bishop, J. L.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Bishop, P. A.**
The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

- Black, F. O.**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110
- Black, Peter G**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Blackmon, James B.**
Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74
- Blackwell-Thompson, Charlie**
Methods and Systems for Advanced Spaceport Information Management – 15
- Blake, D.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Blalock, Norman N.**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Block, Bruce P.**
Thermal modulation for gas chromatography – 62
- Bobotas, Lisa**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Boccippio, Dennis J.**
Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 80
- Boerner, Wolfgang-Martin**
Applications of Polarimetric and Interferometric SAR to Environmental Remote Sensing and its Activities: Recent Advances in Extradwideband Polarimetry, Interferometry and Polarimetric Interferometry in Synthetic Aperture Remote Sensing and its Applications – 60
Basics of SAR Polarimetry II – 57
Basics of SAR Polarimetry I – 58
Recent Advances in Radar Polarimetry and Polarimetric SAR Interferometry – 55
- Bogomolov, V. V.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Bolton, V. J.**
Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 66
- Bonanni, Pierino Gianni**
Method and apparatus for in-situ detection and isolation of aircraft engine faults – 76
- Bonitz, Verena**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Book, Jeffrey W**
Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003 – 87
- Boquet, Albert**
Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 3
- Bosse, Eloi**
Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179
- Bosselman, Suzanne**
Electrical and Mechanical Behavior of Silver-Coated Polymeric Fibers – 67
- Botch, Sabra R**
Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4
- Bouillaud, G.**
French Army - Family Psychological and Social Support – 144
- Bovbjerg, Dana H**
Immune Surveillance, Cytokines and Breast Cancer Risk: Genetic and Psychological Influences in African American Women – 92
- Bowie, Kendra**
Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124
Cognitive Functioning in Long Duration Head-down Bed Rest – 109
- Bowman, James D.**
NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Boynnton, W. V.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
- Brady, Brian B**
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- Brandon, A. D.**
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 189
Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82
- Brandon, Jay M.**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- Braun, Donald C.**
Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- Bray, Aileen**
An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190
- Bringsjord, Selmer**
Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165
- Brotherton, Thomas**
Bootstrap data methodology for sequential hybrid model building – 12
- Brown, Evelyn D**
New Methods for Detection of Fish Populations or Mapping of Fish Habitat – 79
- Brown, Michael G**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Brown, Russell D.**
Expert System Constant False Alarm Rate (CFAR) Processor – 53
- Brozoski, Frederick**
Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 145
- Bruch, Michael**
Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166
- Brueckner, J.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Brunell, Brent Jerome**
Method and apparatus for in-situ detection and isolation of aircraft engine faults – 76
- Buck, Gregory M.**
Quantitative surface temperature measurement using two-color thermographic phosphors and video equipment – 70
- Budlong, Emily**
Multimedia Information Extraction – 183
- Bullo, Francesco**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Burke, James D.**
Atmospheric autorotating imaging device – 70

- Burmeister, Aaron**
Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164
- Burns, Brian D**
The American Military and the Media: Historical Lessons and Future Considerations – 181
- Burns, Richard D.**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13
- Butler, D. J.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Buxbaum, Karen L.**
Planetary Protection Provisions for Mars: Forward and Back Considerations – 14
- Bydlon, Torrev M**
Near Infrared Spectroscopy for Improving Breast Core Needle Biopsy – 97
- Byme, Vicky**
Human Factors in Training – 110
- Cadarette, Bruce S**
Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94
- Cai, Tian-ge**
Effects of Psoralen on ADR Multidrug Resistance and Ca2(+) Concentration in MCF-7/ADR Cells – 117
- Cai, Yu**
Effects of Psoralen on ADR Multidrug Resistance and Ca2(+) Concentration in MCF-7/ADR Cells – 117
- Calaway, M. J.**
Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – 184

Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193
- Calaway, Michael J.**
Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77
- Calderbank, A R**
A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152
- Calderbank, Robert**
Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181
- Calvert, Cilleen**
Deployment Support - Strength through Partnership – 138
- Cammaert, P. C.**
Stress and Psychological Support in Modern Military Operations: A Military Leader's Perspective – 141
- Campos, Ramon**
Space Industry – 16
- Canta, Stefano M**
Sea Clutter Generation and Target Detection – 171
- Cao, Xin-sheng**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118
- Cao, Yang**
Method and Instrument for ECG Measurement Based on Two Electrodes – 118
- Capraro, Gerard T.**
Fundamentals of Knowledge-Based Techniques – 54

Integrated End-to-End Radar Signal and Data Processing with Over-Arching Knowledge-Based Control – 52
- Caraccioli, Paul**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- Carder, Kendall L.**
Method and program product for determining a radiance field in an optical environment – 175
- Cardone, Vincent J**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Carlson, Coby B**
Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98
- Carlson, Jan-Renee**
Verification of Software: The Textbook and Real Problems – 156
- Carpenter, Amanda**
The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196
- Carr, Daniel**
Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147
- Carroll-Garrison, Martina**
Electronics Industry – 65
- Carter, Bob**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- Carter, Robert W.**
Friction stir weld tools – 74

Friction Stir Weld Tools – 75
- Caruso, Christina M.**
Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127
- Case, Joseph Tobias**
Microwave and Millimeter Wave Imaging Using Synthetic Aperture Focusing and Holographical Techniques – 64
- Cash, Howard**
The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- Castellani, John W**
Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- Castle, Pat**
Data Mining SIAM Presentation – 161
- Castro, Carl A.**
Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132
- Castro, Carl Andrew**
Battlemind Training: Building Soldier Resiliency – 138

Leader Actions to Enhance Soldier Resiliency in Combat – 140

The Mental Health Needs Assessment – 126
- Castro, Victoria A.**
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Cavanagh, P. R.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Cawkill, Paul**
Military Leader Perspectives of Psychological Fitness – 129

The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- Cecil, Daniel**
Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 80
- Cepollina, Frank J.**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13
- Cern, Ming-Jyh**
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- C;ervpu.**
The Navy's Support to Sailors in Operations and their Families in France – 134
- Chabot, N. L.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Chai, Juin-Fu**
The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48
- Challoner, A. Dorian**
Multiple internal seal right micro-electromechanical system vacuum package – 62

- Chamis, Christos C.**
Stress Analysis and Fracture in Nanolaminate Composites – 26
- Champagne, Nathan J.**
Evaluating the Gradient of the Thin Wire Kernel – 167
- Chang, Chang-Ching**
Time Delay H(infinity) Control of Structures under Earthquake Loading – 44
- Chang, Cheng-Min**
5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Chang, Chih-Shang**
Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39
- Chang, Chunkuei**
Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47
- Chang, Fwu-An**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- Chang, Kai**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
- Chang, Ya-Hui**
Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40
- Chao, Cheng**
Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49
- Chao, Ching-Kong**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Charland, Philippe**
Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154
Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153
- Chavez, Jr , Robert M**
Basic and Operational Doctrine for Airpower in Irregular Warfare – 18
- Chelliah, H. K.**
Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27
- Chen, Chu-Chang**
Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- Chen, Guang-sheng**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Chen, Huai-qing**
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107
Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120
Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Chen, Jean-Lien**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
- Chen, Jiann-Jone**
Embedded Control System Design and Practice: An Example by a FCU Controller – 45
- Chen, Junjie**
Genomic Instability and Breast Cancer – 97
- Chen, Kung**
Design and Implementation of a Flexible Function Access Control Tool for Web Applications – 39
- Chen, Liang-Rui**
Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 47
- Chen, Shan-guang**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Chen, Sheng-Wei**
Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39
- Chen, Shi-Shuenn**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Chen, Tianqi**
Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46
- Chen, Wei-Lin**
An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- Chen, Wen-Fu**
Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49
- Chen, Ying**
Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101
- Chen, Yu**
An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105
- Cheng, A. F.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Cheng, Shyi-Chyi**
A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
- Cheng, Yuanzhi**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38
- Chern, Ing-Jyh**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
- Chiang, Kai-Wei**
Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- Chiang, Tihao**
An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- Chidester, Thomas**
Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13
- Chovit, Chris**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Christensen, Paul**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Christiansen, E.**
STS-118 Radiator Impact Damage – 21
- Christoforides, Claudine**
The Role of Protein Kinase D (PKD) Signaling in Breast Cancer Cell Migration and Invasion – 99
- Chu, Cheng-Tao**
Indexpro: An Efficient Protein Indexing System Based on Knot Theory – 40
- Chu, Cheng-Wei**
Embedded Control System Design and Practice: An Example by a FCU Controller – 45
- Chu, S. Reynolds**
Spacecraft Internal Acoustic Environment Modeling – 172
- Chuang, Ching-Chiang**
Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48

- Chuang, Shun Lien**
Interband cascade detectors – 176
- Chung, Sheng-Luen**
Embedded Control System Design and Practice: An Example by a FCU Controller – 45
- Chung, Shirley**
The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- Cintala, M. J.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Clark, B. C.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Clark, Micah**
Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165
- Clark, Paul C**
SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- Clausen, Christian**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Clement, Gilles**
Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111
Neuroscience in Space – 123
- Clemett, S. J.**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Cloude, Shane R.**
Polarimetric Interferometry - Remote Sensing Applications – 58
Polarimetric Interferometry - Target Detection Applications – 55
Polarimetric Interferometry – 56
- Cobleigh, Brent**
Autonomous Formation Flight: Project Overview – 1
Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5
- Cochran, Douglas**
Waveform-Agile Tracking In Heavy Sea Clutter – 72
- Cohen, B. A.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Cohen, Ronald B**
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- Cohrs, Randall J.**
Incidence of Latent Virus Shedding during Space Flight – 111
- Cole, Jennifer**
Autonomous Formation Flight: Project Overview – 1
- Collins, Jr., Earl R.**
In vivo electrode implanting system – 88
- Condiotty, Jeff**
Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28
- Cook, Maia B**
Naive Realism in Terrain Appreciation – 169
- Coon, Christina**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Cooper, Lynn P.**
The Power of a Question: A Case Study of Two Organizational Knowledge Capture Systems – 177
- Corbo, James E.**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13
- Couture, Mario**
Complexity and Chaos - State-of-the-Art; List of Works, Experts, Organizations, Projects, Journals, Conferences and Tools – 180
- Cowen, Michael B**
Naive Realism in Terrain Appreciation – 169
- Cox, Andrew T**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Cox, Anthony L.**
Battlemind Training: Building Soldier Resiliency – 138
The Mental Health Needs Assessment – 126
- Croll, Stuart**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Crone, Wendy C**
Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32
- Croom, Mark A.**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- Crossley, William A.**
Modeling and Optimization for Morphing Wing Concept Generation II – 6
Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- Crucian, Brian**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Cucinotta, F. A.**
Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124
- Cucinotta, Francis A.**
Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- Cucinotta, Francis A.**
Science Goals in Radiation Protection for Exploration – 197
- Cui, Li**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Cures, Edwin Z.**
NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Curtiss, Thomas J**
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- Cutts, Dannie**
NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Cuvelier, Yves**
The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- Dabney, Richard W.**
Cushion system for multi-use child safety seat – 36
Cushion System for Multi-Use Child Safety Seat – 74
- Dagdighian, Paul J**
Experimental and Theoretical Investigation of Collisional Energy Transfer in Free Radicals of Atmospheric Importance – 28
- Dalton, H. A.**
Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

- Damos, Diane L.**
Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data – 6
- Dandeker, Christopher**
Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131
- Daniel, Keith**
The Aircraft Industry, 2006 – 10
- Daniels, Christopher C.**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Danielson, L. R.**
L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
- Danielson, L.**
Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78
- Darte, Kathy**
Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128
- Das, Subrata**
A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models – 158
- Datta, Anirban**
Reversal of Breast Cancer Phenotype to Normal in Vitro by Transposon-Mediated Mutagenesis and Identification of Associated Genetic Changes – 102
- Datta, Kaustubh**
Elucidation of the Molecular Mechanisms Underlying Lymph Node Metastasis in Prostate Cancer – 100
- Davidson, Kenneth**
TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161
- Davis, Eric W**
Review of Laser Lightcraft Propulsion System (Preprint) – 16
- Davis, Stephan R.**
The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 15
- Day, D. E.**
Containerless Processing of a Lithium Disilicate Glass – 24
In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24
- Debaille, V.**
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 189
- Degrange, X.**
The Navy's Support to Sailors in Operations and their Families in France – 134
- DeJohn, Charles**
Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 3
- Delahajj, R**
Stress Training and the New Military Environment – 142
- delaTorreJuarez, Manuel**
Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- Dello Russo, N.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Delzeit, Lance D.**
Increased alignment in carbon nanotube growth – 61
- Denise, Pierre**
Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111
- Dennis, Melanie**
An International Survey of Maintenance Human Factors Programs – 8
- Desai, Prasun N.**
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
Reconstruction of the Genesis Entry – 21
- Desai, Soni**
Development and Results of CORA DWAN Website Survey – 184
Two Crowd Control Case Studies – 170
- DeSain, John D**
Testing of LiAlH₄ as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- deSouza, P. A., Jr.**
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- deSouza, P.**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
- Dessureault, Dany**
Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154
Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153
- deVries, Maaike**
Guideline for Early Interventions – 141
- deVries, Rodney**
Good Practices of End of Deployment Debriefing in the Royal Netherlands Navy – 136
- DeWald, Adrian**
An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33
- Di, K.**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
- Didoszak, Jarema M**
Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158
- Diev, Vesselin**
Data Mining SIAM Presentation – 161
- Ding, Jeff**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- DiRocco, Christopher**
Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – 29
- Dobbins, III, James T**
Optimization and Comparison of Different Digital Mammographic Tomosynthesis Reconstruction Methods – 101
- Dobrea, E. Z. Noe**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Doherty, Roger D**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- Domchek, Susan M**
Universal Breast Cancer Antigens as Targets Linking Early Detection and Therapeutic Vaccination – 96
- Donaghay, Percy L**
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- Donelan, Mark A**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Dong, Da-yong**
An Analysis of Relation between Changes of Pupil and Mental Workloads – 119
- Dong, Ziu-zhen**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Dongerren, Ap van**
Modeling of Hurricane Impacts – 87

- Donohue, Brendon R**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- Donovan, Daniel**
Electronics Industry – 65
- Druggan, Tom**
News Media Industry – 180
- Drummond, J. P.**
Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27
- Du, Guangwei**
Identification of New Serum Biomarkers for Early Breast Cancer Diagnosis and Prognosis Using Lipid Microarrays – 93
- Duffie, Jennifer**
Mathematical Approach to the Evaluation and Planning of Influence Operations – 168
- Dulchavsky, S. A.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Dullerud, Geir E**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Duncan, J A**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Duncan, J. M.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Dunlap, Patrick H., Jr.**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Dursun, Sanela**
PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137
- Eastwood, Michael**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Eaton, Karen M.**
Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132
- Ebert, D.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Eckhoff, Anthony**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Egbert, Gary D**
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163
- Ehlmann, B. L.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Eichenberg, Dennis J.**
Hybrid Power Management System and Method – 64
- Eimers-van Nes, Rejanne**
The Will to Fight - Evaluation of Dutch Morale Research during Several Missions Since 1997 – 139
- Ellenberger, Rich**
Using Life-Cycle Human Factors Engineering to Avoid \$2.4 Million in Costs: Lessons Learned from NASA's Requirements Verification Process for Space Payloads – 147
- Ellerbrock, Philip J.**
Network device interface for digitally interfacing data channels to a controller via a network – 160
- Ellis, Arthur B**
Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32
- Ellis, Dale D**
Measurements and analysis of reverberation, target echo, and clutter: FY06 Annual Report for Office of Naval Research Awards N00014-06-1-0830 and N00014-03-1-0420 – 162
- Elrod, Susan V.**
Cushion system for multi-use child safety seat – 36
Cushion System for Multi-Use Child Safety Seat – 74
- Ely, Donald W.**
Methods and Systems for Advanced Spaceport Information Management – 15
- England, Scott A.**
Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 148
- Ennix, Kimberly**
Autonomous Formation Flight: Project Overview – 1
- Entrekin, Sean F.**
Preliminary Results of an Experimental Investigation of the Qu Superconducting Heat Pipe – 74
- Erricolo, Danilo**
Sea Clutter Generation and Target Detection – 171
- Estridge, Jon D**
Space Industry – 16
- Evans, Cynthia A.**
The Crew Earth Observations Experiment: Earth System Science from the ISS – 79
- Everett, H R**
Layered Augmented Virtuality – 165
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- Fan, Quan-chun**
Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120
- Fang, Fuh-Min**
Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- Fang, Wen-Pinn**
Universal Share for the Sharing of Multiple Images – 40
- Farese, Ann M**
Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102
- Farina, A.**
Application of Knowledge-Based Techniques to Tracking Function – 54
Introduction to Radar Signal and Data Processing: The Opportunity – 51
- Farrar, Brian M**
Comparison of F-15E and F-16 Dynamic Targeting Persistence in a Fuel-Limited Environment – 8
- Farrell, Philip S**
Control Theory Perspective of Effects-Based Thinking and Operations: Modeling 'Operations' as a Feedback Control System – 169
- Feher, Bela A**
Heuristic Automation for Decluttering Tactical Displays – 65
- Feiner, Steven K**
Augmented Reality for Maintenance and Repair (ARMAR) – 160
- Feiveson, Alan H.**
Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146

- Fellars, D**
Layered Augmented Virtuality – 165
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
- Fen, Chiu-Shia**
Influence of Spatial Variability of Soil Properties on Mass Removal for a Soil Vapor Extraction System – 47
- Feng, Xiao-zhen**
Effects of Psoralen on ADR Multidrug Resistance and Ca2(+) Concentration in MCF-7/ADR Cells – 117
- Ferguson, Howard**
News Media Industry – 180
- Fernando, Dilhan**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Feron, Eric**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Ferrer, Mike A.**
Derivation of Boundary Manikins: A Principal Component Analysis – 146
- Ferro-Famil, Laurent**
Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60
Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59
- Few, Stephanie**
Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158
- Filipek, Laura B.**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Fils, Jean-Francois**
The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129
The Measurement of Morale among Belgian Military Personnel Deployed in Crisis Response Operations: A Longitudinal Survey Design – 143
- Fisher, John**
Electronics Industry – 65
- Fisher, Nancy**
NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Fitts, David J.**
Human Factors in Human-Systems Integration – 150
- Fitts, M. A.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Fitts, M.**
Life Sciences Data Archive (LSDA) – 103
- Fitzpatrick, Garret**
Generation Y Perspectives – 176
- Fleischer, I.**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Flemming, Steve**
PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137
- Fletcher, L. A.**
Curation of Frozen Samples – 184
- Flinn, Edward D.**
Fast Track for a Slower Rocket Engine – 23
Ion Focusing Improves Hall-Effect Thruster – 65
- Florea, Mihai C**
Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179
- Follansbee, Nicole M.**
Mission Medical Information System – 115
- Foret, Jean Michel**
Measuring Morale within the French Army – 125
- FORTescue, Paul**
Marine Mammals and Active Sonar – 172
- Frakes, Patrick F**
Space Industry – 16
- Francisco, David**
Risks Associated with Long-Term Spaceflight – 112
- Frazzoli, Emilio**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Freeman, Waldo D**
Assessing the Adequacy of Coverage of Joint Command and Control in the Capstone Concept for Joint Operations – 49
- Freeman-Perez, Sondra A.**
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
- Fremaux, C. Michael**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- French, Claire**
Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131
- Frolik, Steven A**
Testing of LiAlH4 as a Potential Additive to Paraffin Wax Hybrid Rocket Fuel – 36
- Fu, Feng**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Fu, Ping-feng**
Kinetics of Reaction between LiOH - H2O and CO2 – 119
- Fu, Yili**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38
- Fu, Yu**
Embedded Control System Design and Practice: An Example by a FCU Controller – 45
- Fu, Zhao-ju**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Fuelberg, H.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Fullerton, Gordon**
Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5
- Fuss, T.**
In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24
- Fussell, Ronald M.**
Methods and Systems for Advanced Spaceport Information Management – 15
- Gabb, Timothy P.**
Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 31
- Gaillard, A. W. K.**
Stress Training and the New Military Environment – 142
- Gamble, Rose**
Fuselet Workflow Inspection and Feedback – 183
- Gao, Mei**
Expression, Purification of hClock (35 -47) and Verification of Its Transmembrane Ability in Vitro – 90

- Gao, Xiao-rong**
A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 116
- Garbutt, Philip F. C.**
The Paradox of Fight or Flight - A Leadership Guide to Understanding and Mitigating Operational Stress Injuries – 143
- Garcia-Sanz, Mario**
Quantitative Robust Control Engineering: Theory and Applications – 151
- Garg, Sanjay**
Implementation Challenges for Multivariable Control: What You Did Not Learn in School – 12
- Garrido, M. J.**
Morale as a Protection Factor against Mission Related Stress – 135
- Gary, Janice K**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Ge, Dong-xia**
Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Geiger, Cherie L.**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Gellert, R.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Genc, K. O.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Georgakilas, Alexandros G.**
Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104
- George, Kerry A.**
Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124
- Gerty, Christopher E.**
Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196
- Ghosn, Louis J.**
Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26
- Gilbert, Tricia**
Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 1
- Gilden, Donald H.**
Incidence of Latent Virus Shedding during Space Flight – 111
- Gillen, Glen D**
Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – 29
- Gillette, David**
Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- Gillis, Allan**
Sonar 3 VMSA Federate: User Guide and Technical Description – 157
- Gilmore, Adam**
Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 66
- Gin, Douglas L**
Polymers and Liquid Crystals Symposium held in Boston, Massachusetts on August 19-23, 2007 (Abstracts) – 29
- Girven, Rich**
News Media Industry – 180
- Glavin, D. P.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Glenney, William**
Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179
- Gnaff, T. G.**
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Gnatowski, Marek**
Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 34
- Golden, D. C.**
Acid Vapor Weathering of Apatite and Implications for Mars – 85
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
- Golden, John**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19
- Goldman, J F**
Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28
- Goldman, Scott M**
Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13
- Goldman, Scott**
An International Survey of Maintenance Human Factors Programs – 8
- Goolsbey, Keith**
Efficient Pathfinding in Very Large Data Spaces – 159
- Gopalakrishnan, R.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Gordon, Brandon W**
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Gough, Kerry M.**
Collaborative Mission Design at NASA Langley Research Center – 168
- Gould, R B**
Feasibility of Developing a Common U.S. Army Helicopter Pilot Candidate Selection System: Analysis of U.S. Air Force Data – 6
- Grab, Lisa B**
Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102
- Graber, Hans C**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Grady, Dennis E**
Analysis of Shock and High-Rate Data for Ceramics: Strength and Failure of Brittle Solids – 34
- Grant, Robert L.**
Network device interface for digitally interfacing data channels to a controller via a network – 160
- Green, Joseph J.**
An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71

- Green, Robert O.**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Greenberg, Neil**
Do Military Peacekeepers Want to Talk about Their Experiences? Perceived Psychological Support of UK Military Peacekeepers on Return from Deployment – 129
How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133
- Greene, Nathanael J.**
High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- Greenisen, M. C.**
The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149
- Grenier, Stephane**
Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128
Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134
- Gribok, A**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- Griffiths, H. D.**
Impact of Knowledge-Based Techniques on Emerging Technologies – 52
Knowledge-Based Solutions as They Apply to the General Radar Problem – 51
- Grimble, Michael J.**
Advanced Control Law Tuning and Performance Assessment – 151
- Gross, M.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Grugel, Richard N.**
Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190
- Grushcow, Marc**
Gambling Task (fMRI Revision 3.0.1) – 170
- Guan, Ying-ting**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- Guemmer, Paul**
Electronics Industry – 65
- Guest, Kimberly**
Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134
- Guest, Peter**
TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161
- Guha, Shekhar**
Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – 29
Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173
- Guiney, John L**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Guo, Qing-xia**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Guo, Shi-jun**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Guo, Shuang-sheng**
Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148
- Guo, Xiao-jie**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Guo, Xu-dong**
Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106
- Hackworth, Carla**
An International Survey of Maintenance Human Factors Programs – 8
- Hada, M.**
Chromosome Aberration in Human Blood Lymphocytes Exposed to Energetic Protons – 124
- Hada, Megumi**
Formation of Clustered DNA Damage after High-LET Irradiation: A Review – 104
- Hagen, Scott C**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Hagiya, Kenji**
Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Hale, Joe**
NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195
- Hale, Joseph P.**
An Overview of Space Exploration Simulation (Basis of Confidence) Documentation – 190
- Integrated Modeling and Simulation Verification, Validation, and Accreditation Strategy for Exploration Systems Mission Directorate – 177
- Hallinan, K P**
Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67
- Halpin, Paul C.**
Methods and Systems for Advanced Spaceport Information Management – 15
- Halterman, Ryan**
Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166
- Hamilton, D. R.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Hamm, Dustin**
JBoss Middleware for Spacecraft Trajectory Operations – 160
- Hammond, D. K.**
Lunar Dust and Lunar Simulant Activation and Monitoring – 193
- Hammond, Dinne K.**
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Han, Weiwei**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Hanggi, P**
Quantum Computing Using Superconducting Qubits – 174
- Hansen, Jennifer**
Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5
- Hanson, Alfred K**
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- Hao, Hong-wei**
Method and Instrument for ECG Measurement Based on Two Electrodes – 118
- Harada, K**
Quantum Computing Using Superconducting Qubits – 174
- Hardjadinata, S**
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
- Harford, James**
Sputnik and the Dawn of the Space Age – 198

- Harms, Robert**
Electronics Industry – 65
- Harper, Karen A**
A Toolkit for Building Hybrid, Multi-Resolution PMESII Models – 158
- Hasan, David**
NASA Constellation Distributed Simulation Middleware Trade Study – 161
- Hash, C.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Hasselbrink, Ernest F.**
Thermal modulation for gas chromatography – 62
- Hatamleh, Omar**
An Investigation of the Through Thickness Residual Stresses in Friction Stir Welded 2195 and 7075 Aluminum Alloy Joints – 33
- Hausrath, E. M.**
Acid Vapor Weathering of Apatite and Implications for Mars – 85
- Hayat, Matthew J.**
Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- Hayworth, Ken J.**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- He, Wen-hui**
Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106
- Headley, Gary**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Heber, Alexandra**
Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128
- Heim, Eugene H.**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- Hellman, Martin**
Polarimetric Interferometry - Remote Sensing Applications – 58
Polarimetric Interferometry - Target Detection Applications – 55
Polarimetric Interferometry – 56
- Hely-Morrow, Isabel**
Global Deployment of Reserve Soldiers: A Leadership Challenge – 130
- Henderson, Steven J**
Augmented Reality for Maintenance and Repair (ARMAR) – 160
- Henriksen, Steve**
Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 1
- Unmanned Aircraft System Control and ATC Communications Bandwidth Requirements – 5
- Hensley, Robin**
Marine Mammals and Active Sonar – 172
- Herman, Robert L.**
Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- Herr, Sean**
News Media Industry – 180
- Herrin, J. S.**
Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83
- Herrin, J.**
STS-118 Radiator Impact Damage – 21
- Hervol, David**
Test Results From a Simulated High-Voltage Lunar Power Transmission Line – 68
- Higgins, Andrew**
Initiation and Sensitization of Detonable Hydrocarbon/Air Mixtures for Pulse Detonation Engines – 30
- Hinson, Matt**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Hoffman, Stephen J.**
Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196
- Hoge, Charles W.**
Battlemind Training: Building Soldier Resiliency – 138
Impact of Combat Duty in Iraq and Afghanistan on Family Functioning: Findings from the Walter Reed Army Institute of Research Land Combat Study – 132
- Holbrook, Jack**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Holcomb, Kali**
An International Survey of Maintenance Human Factors Programs – 8
- Holden, Kritina**
Information Presentation – 146
- Hole, Stein O**
Marine Mammals and Active Sonar – 172
- Holz, Jill M.**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13
- Hommelgaard, Birgitte**
My Father is a Soldier - A Children's Book – 133
- HonerzuBentrup, Kerstin**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Hong, Feng**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Hong, John M.**
Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39
- Hook, Simon**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 22
- Horne, John K**
Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173
- Hou, Wen-sheng**
Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107
Relationship between Surface EMG and Angle of Elbow Joint – 108
- Houston, Trevor**
Micro-PSYPRE (Psi m sub x): Toward Computing the Future – 165
- Hovanec, Christopher J**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- Howard, Stephen D**
A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152
- Howell, Cass**
Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 3
- Howey, Amanda M**
Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170
- Hsieh, Shang-Hsien**
Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46
- Hsu, Chau Yun**
Low Complexity Convolutional Codes of Rate 2/N – 38
- Huang, Ngan Fong**
Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25

- Huang, Tai-Chi**
Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45
- Huang, Yun-Wen**
Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- Hughes, Chanita**
Genetic Counseling for Breast Cancer Susceptibility in African American Women – 96
- Hughes, Eli**
Thin, nearly wireless adaptive optical device – 69
- Hummer, Eric**
News Media Industry – 180
- Humphreys, B.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Hung, Chang-Mao**
Wet Air Oxidation of Aqueous Ammonia Solution Catalyzed by Bimetallic Pt/Rh Nanoparticle Catalysts – 44
- Hunt, Pamela**
Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102
- Huo, Qun**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Hurlburt, Harley E**
U.S. GODALE: Global Ocean Prediction With the HYbrid Coordinate Ocean Model – 163
- Hurtado, Martin**
Polarimetric Detection of Targets in Inhomogeneous Clutter – 72
Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71
- Hyde, J.**
STS-118 Radiator Impact Damage – 21
- Hyers, R W.**
Containerless Processing of a Lithium Disilicate Glass – 24
- Iida, Y.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Inal, Cynthia E**
5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Ingram, JoAnne L.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Inoyam, Daisaku**
Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- Irvine, Cynthia E**
SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- Isberg, Jan**
Psychological Fitness - Experiences from UN Military Peace Enforcement Operations in the DRC April 2003 - January 2005 – 130
- Ito, Haruhiko**
Development of Near-Field-Light Lens for Nano-Focusing of Atoms – 174
- Izadi, Hojjat A**
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Jacobsen, B.**
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 189
- Jacobson, Craig A.**
Methods and Systems for Advanced Spaceport Information Management – 15
- Jain, Varsha**
Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146
- James, John T.**
Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104
STS 120 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-120) and International Space Station (10A) – 18
- Jedhrich, Nicholas M.**
Method and associated apparatus for capturing, servicing, and de-orbiting earth satellites using robotics – 13
- Jeevarajan, A. S.**
Lunar Dust and Lunar Simulant Activation and Monitoring – 193
- Jenekhe, Samson A**
High Mobility Conjugated Polymers – 34
- Jensen, Robert E**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Jerome, Christian J**
Heuristic Evaluation of a User Interface for a Game-Based Simulation – 170
- Ji, Yu-huan**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Ji, Zhi-hong**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90
- Jia, Hong-bo**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Jiang, Shi-zhong**
Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116
- Jiang, Xiao-hui**
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Jiang, Zhou**
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Jin, De-wen**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Jin, Jenny**
Additional Technologies and Investigations for Provision of Future Aeronautical Communications – 1
- Jin, Lian-hong**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Jin, Wei-hua**
Effects of Interleukin-1 Receptor Antagonist Gene Polymorphism in Cardiovascular Events of Patients with Coronary Arterial Disease – 91
- Jin, Zhi-hao**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- Jing, Xiao-lu**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
- Jing, Xing**
Information Complexity in Air Traffic Control Displays – 182
- Joe, John C.**
Mission Medical Information System – 115
- Johnson, Jean**
Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158
- Johnson, Kenneth**
NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- Johnson, Robert D**
Antiemetics With Concomitant Sedative Use in Civil Aviation Pilot Fatalities: From 2000 to 2006 – 4

- Johnson, William**
An International Survey of Maintenance Human Factors Programs – 8
- Johnson-Throop, Kathy A.**
Mission Medical Information System – 115
- Johnson-Throop, Kathy**
Life Sciences Data Archive (LSDA) – 103
- Johnston, Robert K**
A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155
- Jones, Christopher D**
Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173

Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28
- Jones, J. H.**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187

Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- Jones, James J.**
Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142
- Jones, Jeffrey A.**
International Space Station Medical Operations – 122
- Jones, Thomas B.**
Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- Jones, Thomas D.**
Shuttle to Orion: First Steps Back to Orbit – 18
- Joo, James J**
Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- Jordan, Mary**
TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161
- Jousselme, Anne-Laure**
Fusion of Imperfect Information in the Unified Framework of Random Sets Theory: Application to Target Identification – 179
- Kadono, T.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Kaiser, M. K.**
Information Presentation – 146
- Kalidindi, Surya R**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- Kang, Wei-yong**
An Analysis of Relation between Changes of Pupil and Mental Workloads – 119
- Kaufman, Rob**
News Media Industry – 180
- Kaushal, Deepak**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Kebo, Andrew**
The Role of Frame Force in Quantum Detection – 167
- Keller, L. P.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186

Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187

New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Keller, Lindsay P.**
N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187
- Kelly, Brian T**
Space Industry – 16
- Kelly, Timothy**
Electronics Industry – 65
- Kendra, A**
Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4
- Kern, Roger**
The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- Kerstman, E.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Ketsdever, Andrew D**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Keydel, Wolfgang**
Introduction: Background, Goal and Content of the Lecture Series on Polarimetric SAR Interferometry – 57

Normal and Differential SAR Interferometry – 58

Polarimetry and Interferometry Applications – 55

Present and Future Airborne and Spaceborne Systems – 59
- Khare, Bishun N.**
Functionalization of carbon nanotubes – 62

Functionalization of Carbon Nanotubes – 176
- Khorasani, K**
Nonlinear Fault Detection, Isolation and Recovery Techniques for Unmanned Systems – 7
- Khuntong, Patcharavadee**
Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47
- Kiessling, Laura L**
Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98
- Killingsworth, M D**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Kim, Myung-Hee**
Evaluations of Risks from the Lunar and Mars Radiation Environments – 197
- Kim, S. Y.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Kinder, Joseph**
News Media Industry – 180
- Kindle, John C**
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163
- King, Michael R.**
Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- Kitajewski, Jan K**
Role of Notch/VEGF-Receptor 3 in Breast Tumor Angiogenesis and Lymphangiogenesis – 99
- Kite, Marlen T.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Klingelhofer, G.**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85

Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84

Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- Klingelhofer, G.**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
- Kloeck, W.**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187

- Knight, Amanda**
The Pressurized Logistics Module: Providing Consumables and Resupply Logistics to the Lunar Surface for a Long-duration Manned Mission – 196
- Knight, Kevin**
Efficient Pathfinding in Very Large Data Spaces – 159
- Kniskern, Kenneth M**
The Need for a USAF UAV Center of Excellence – 9
- Knowles, Gareth**
Thin, nearly wireless adaptive optical device – 69
- Kobus, David A**
Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42
- Kochary, F.**
Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- Kogut, G**
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- Konz, Daniel W.**
Network device interface for digitally interfacing data channels to a controller via a network – 160
- Koontz, Steven L.**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19
- Koukol, Robert**
The Validation of Vapor Phase Hydrogen Peroxide Microbial Reduction for Planetary Protection and a Proposed Vacuum Process Specification – 20
- Kreeger, Richard E.**
Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- Kreim, Guenter**
Family Support in the German Armed Forces – 139
- Krenek, Sam**
Space Radiation Program Element – 113
- Krga, Paul**
Herc SAR Task 106: AIMS Feature Development – 156
- Kring, D. A.**
Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- Krishnamurthy, Srini**
Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173
- Ku, Young**
Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45
- Kuei, Ching-Pin**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- Kuklis, M. M.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Kumar, P R**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Kumaresan, Sakthi Preethi**
Data Mining SIAM Presentation – 161
- Kunec, Daniel L**
Space Industry – 16
- Kung, Gordon T.**
Equipment and Testing Procedures for Small Strain Triaxial Tests – 41
- Kuo, Chen-Tsung**
A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
- Kuo, Tsung Sheng**
Low Complexity Convolutional Codes of Rate 2/N – 38
- Kutyniok, Gitta**
Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181
- Lai, Oiki Sylvia**
Effect of Processing and Subsequent Storage on Nutrition – 103
- Lai, Wei-Ming**
A Patch-Growing Approach to 3D Model Segmentation Using a Shortest-Path Labeling Technique – 38
- Lajous, O.**
The Navy's Support to Sailors in Operations and their Families in France – 134
- Lall, Sanjay**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Lam, Chiu-wing**
Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104
- Lamoureux, Tab**
Review of Collaborative Tools for Planning and Engineering – 159
- Langston, Vicky**
How to TRIM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133
- Langton, John**
A Framework for Building and Reasoning with Adaptive and Interoperable PMESII Models – 158
- Lapen, T. J.**
Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82
- Lapen, T.**
Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188
- Larar, Allen**
Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- Larson, Jacoby**
Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166
- Lason, William E.**
NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- Lauer, H. V.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
- Lawler, Dennis G.**
A Testbed for Evaluating Lunar Habitat Autonomy Architectures – 148
- Lawless, Kirby**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- Le, Loan**
Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Leahy, Daniel J**
Structure and Mechanism-Based Design of ErbB Receptor Inhibitors – 98
- Lear, Dana M.**
STS-118 Radiator Impact Damage – 21
- Lederer, S. M.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
- Lee, C. T.**
Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78
- Lee, C-T. A.**
Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83
- Lee, C.-T. A.**
Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82

- Lee, Jong-Sen**
Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60
- Lee, Jon-Sen**
Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59
- Lee, K. T.**
GCR-Induced Photon Luminescence of the Moon – 191
- Lee, Liang-Sun**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37

Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Lee, R H**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Lee, San-Liang**
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Lee, William M**
Evaluation of Listeria Monocytogenes Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97
- Lei, Dong**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Lei, Hin-Chi**
Invariant Solutions of the Equation of Motion for a Sphere Composed of Blatz-Ko Material – 39
- Lenat, Douglas B**
Efficient Pathfinding in Very Large Data Spaces – 159
- Lescinski, Jamie**
Modeling of Hurricane Impacts – 87
- Leshem, Amir**
Information Theoretic Radar Waveform Design for Multiple Targets – 164
- Leshner, C. E.**
In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24
- Levin, Timothy E**
SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- Lewis, Matthew R**
Environmental Assessment Golf Learning Center and Driving Range – 77
- Li, De-yu**
Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175
- Li, Hu-lun**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Li, Jian**
Interband cascade detectors – 176
- Li, Jian-hui**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Li, Jun**
Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – 25

Nanoengineered thermal materials based on carbon nanotube array composites – 63
- Li, Loan**
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
- Li, Lu-ming**
Method and Instrument for ECG Measurement Based on Two Electrodes – 118
- Li, R.**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
- Li, Su-ping**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Li, Yan**
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107

Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Li, Y**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- Li, Yi**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- Li, Yi-Chao**
Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- Li, Yong-zhi**
Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120
- Li, Yuanzhang**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Liang, Tsung-Chi**
Investigation on the Aerodynamic Instability of a Suspension Bridge with a Hexagonal Cross-Section – 48
- Liao, Chunghsin**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38
- Liao, Qi-mei**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Liao, Wen-I.**
The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48
- Libardoni, Mark**
Thermal modulation for gas chromatography – 62
- Liberzon, Daniel**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Lieberman, Harris R.**
Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127
- Lilly, T C**
Performance Characterization of the Free Molecule Micro-Resistojet Utilizing Water Propellant (Preprint) – 17
- Lim, Dawn Y.**
A Medical Simulation Based Curriculum to Address Medical Contingencies Aboard the International Space Station – 110
- Lin, Chi-Chang**
Time Delay H(infinity) Control of Structures under Earthquake Loading – 44
- Lin, Chih-Hsien**
Estimation of Regional Evapotranspiration by Adaptive Network-Based Fuzzy Inference System for Dan-Shui Basin in Taiwan – 49
- Lin, Ja-Chen**
Universal Share for the Sharing of Multiple Images – 40
- Lin, Sun-Ting**
Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47
- Lin, Woei**
A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149
- Lin, Yu-Yuan**
Design Lateral Forces of Buildings with and without Base Isolation System between MOI-2005 and NEHRP-2003 – 40

- Lin, Zhong-lin**
A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 116
- Lind, Richard**
TNT07 MIO San Francisco Bay, Atmospheric Effects After Action Report – 161
- Lindsey, James**
Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Cannula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 145
- Ling, Rui**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Lipsitz, L. A.**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110
- Lisse, C. M.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Litaker, Harry L., Jr.**
Human Factors in Human-Systems Integration – 150
- Liu, Benyong**
Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46
- Liu, Bing-kun**
Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116
- Liu, Chen**
Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72
- Liu, Cheng-gang**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Liu, Chia-Lung**
A Sliding-Window Parallel Packet Switch for High-speed Networks – 150

Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149
- Liu, Chin-Yen**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- Liu, Fang**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
- Liu, Fu-ping**
Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117
- Liu, Jean**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- Liu, Ji-Chyun**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- Liu, Jing**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Liu, Kun-xiang**
Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90
- Liu, Taotao**
Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181
- Liu, Xiao-Heng**
Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107
- Liu, Xin-min**
Progress and Countermeasure of Effect of Space Flight Environment Factors on Learning and Memory Function – 120
- Liu, Xu**
Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- Liu, Yan-you**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90

Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Liu, Zhong**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Liu, Zhong-qi**
An Analysis of Relation between Changes of Pupil and Mental Workloads – 119
- Lizotte, Michel**
Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154

Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153
- Lomakin, Oleg**
Rapid flow fractionation of particles combining liquid and particulate dielectrophoresis – 63
- Lorenz, Mary J.**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19
- Lou, Der-Chyuan**
Concrete Ingots Covered with Interdigital FSS Screens as Broadband Microwave Absorbers – 44
- Love, Bradley C**
Maximizing the Benefits of Training by Example and Direct Instruction – 154
- Love, Mattie**
Electronics Industry – 65
- Lu, Chan-Nan**
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Lu, Yao-feng**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Lucena, Angel**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Lundblad, Nathan**
A High Power Frequency Doubled Fiber Laser – 73
- Luo, Wenyu**
Three-Dimensional Propagation and Scattering Around a Conical Seamount – 166
- Luvall, Jeffrey C.**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 22
- Lv, Gui-xiang**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Lynch, Nancy A**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Lyons, F.**
STS-118 Radiator Impact Damage – 21
- Ma, Bo-zhi**
Method and Instrument for ECG Measurement Based on Two Electrodes – 118
- Ma, Chih-Ming**
Decomposition of 2-Chlorophenol by Sonolysis in Aqueous Solution Saturated with Various Dissolved Gases – 45
- Ma, Hong-lei**
Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116
- Ma, Li**
Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107

- MacKay, Rebecca A.**
Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 31
- MacVittie, Thomas J**
Combined Administration of Recombinant Human Megakaryocyte Growth and Development Factor and Granulocyte Colony-Stimulating Factor Enhances Multilineage Hematopoietic Reconstitution in Nonhuman Primates after Radiation-Induced Marrow Aplasia – 102
- Maeda, A**
Quantum Computing Using Superconducting Qubits – 174
- Maender, C. C.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Majecki, Pawel**
Advanced Control Law Tuning and Performance Assessment – 151
- Makris, Nicholas C**
Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging With Ocean-Waveguide Acoustics – 173
- Malaret, E.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Malavergne, V.**
Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192
- Maleki, Lute**
A High Power Frequency Doubled Fiber Laser – 73
- Malin, Jane T.**
Early Design Choices: Capture, Model, Integrate, Analyze, Simulate – 171
- Manes, Daniel I**
Heuristic Automation for Decluttering Tactical Displays – 65
Naive Realism in Terrain Appreciation – 169
- Mango, Stephen A.**
Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- Manigart, Philippe**
The Belgian Concept of Social-Psychological Support of Families of Military Personnel Deployed in Crisis Response Operations – 129
- Mao, H.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Marchesoni, F**
Quantum Computing Using Superconducting Qubits – 174
- Margerum, Sarah**
Applications of Human Factors in Space – 147
Derivation of Boundary Manikins: A Principal Component Analysis – 146
- Marinov, Iliya**
Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135
- Martin, David S.**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
- Mata, Carlos T.**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Matthews, G.**
Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 86
- Matveev, V. P.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Maughan, Ben**
Marine Mammals and Active Sonar – 172
- Maupin, Patrick**
RAP Simulation Environment Characteristics – 153
- Mayton, Donna J**
Nondestructive Evaluation Technology Initiatives II. Delivery Order 0002: Whole Field Turbine Disk Inspection – 10
- McCall, Robert**
Modeling of Hurricane Impacts – 87
- McCann, R. S.**
Information Presentation – 146
- McCarter, Mike**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- McCarty, R**
Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67
- McCoy, T. J.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- McCreary, Donald R.**
Enhancing Mental Readiness in Military Personnel – 131
- McCubbin, Ian**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- McDowell, Mark**
Tracking of Cells with a Compact Microscope Imaging System with Intelligent Controls – 63
Tracking of cells with a compact microscope imaging system with intelligent controls – 69
- McEwen, A. S.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- McGurk, Dennis**
Leader Actions to Enhance Soldier Resiliency in Combat – 140
- McIntosh, Dawn**
Data Mining SIAM Presentation – 161
- McKay, G. A.**
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
- McKenna, Sean S**
The Final Frontier: News Media's Use of Commercial Satellite Imagery during Wartime – 17
- McKenna, Thomas M**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- McKenzie, Wendy**
Global Deployment of Reserve Soldiers: A Leadership Challenge – 130
- McKeown, N. K.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Mclemore, Carole**
NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- McReynolds, James**
Electronics Industry – 65
- McSween, H. Y., Jr.**
K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83
- Mead, Jr, Franklin B**
Review of Laser Lightcraft Propulsion System (Preprint) – 16
- Meade, Phillip T.**
Methods and Systems for Advanced Spaceport Information Management – 15
- Meck, Janice V.**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121

- Meck, Janice**
Risks Associated with Long-Term Spaceflight – 112
- Medelius, Pedro J.**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Mehta, Satish K.**
Incidence of Latent Virus Shedding during Space Flight – 111
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Mehta, Satish**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Meier, Gary M.**
Methods and Systems for Advanced Spaceport Information Management – 15
- Meijer, Marten**
Good Practices of End of Deployment Briefing in the Royal Netherlands Navy – 136
- Mellema, Garfield R.**
An Operator Perspective on Net-Centric Underwater Warfare – 50
Correlation Based Testing for Passive Sonar Picture Rationalization – 165
- Menapace, J A**
Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28
- Merritt, Laura**
Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 66
- Messenger, S.**
Coordinated Chemical and Isotopic Studies of GEMS in IDPS – 187
N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Meyyappan, Meyya**
Functionalization of carbon nanotubes – 62
Functionalization of Carbon Nanotubes – 176
Nanoengineered Thermal Materials Based on Carbon Nanotube Array Composites – 25
Nanoengineered thermal materials based on carbon nanotube array composites – 63
- Miao, Dan-min**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
- Michalski, J. R.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Michel, Anna P**
Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a New in situ Chemical Sensing Technique for the Deep Ocean – 174
- Mielnik, John J.**
Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4
- Mikouchi, Takashi**
Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Miller, Jim**
Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- Milum, Kristen M.**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27
Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Minard, C. G.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Mineau, David A**
Coercive Airpower in the Twenty First Century – 3
- Ming, D. W.**
Acid Vapor Weathering of Apatite and Implications for Mars – 85
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Mitchell, John C**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Mitobe, Kazu-taka**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Mitter, Sanjoy K**
Cooperative Networked Control of Dynamical Peer-to-Peer Vehicle Systems – 8
- Mittlefehldt, D. W.**
Are Fullerenes Relevant to Cosmochemistry? A New Finding – 178
Genesis of Augite-Bearing Ureilites: Evidence From LA-ICP-MS Analyses of Pyroxenes and Olivine – 83
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83
Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- Mittlefehldt, David W.**
Meteorite Dunite Breccia MIL 03443: A Probable Crustal Cumulate Closely Related to Diogenites from the HED Parent Asteroid – 85
- Moelker, R.**
Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126
- Mohajeri, Nahid**
Catalytic dehydrogenation of amine borane complexes – 26
- Monaghan, D**
Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67
- Moore, Casey**
Transitioning Submersible Chemical Analyzer Technologies for Sustained, Autonomous Observations From Profiling Moorings, Gliders and other AUVs – 42
- Moore, Frank G**
The 2009 Version of the Aeroprediction Code: The AP09 – 2
- Moore, Linda Y**
The 2009 Version of the Aeroprediction Code: The AP09 – 2
- Moore, Thomas C.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Moran, William**
A Simple Signal Processing Architecture for Instantaneous Radar Polarimetry – 152
- Morgan, Brian**
Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29

- Morgan, Jay P**
Space Industry – 16
- Morrell, Darryl**
Waveform-Agile Tracking In Heavy Sea Clutter – 72
- Morrell, D**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- Morris, R. B.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Morris, R. V.**
Acid Vapor Weathering of Apatite and Implications for Mars – 85
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Moessbauer and Electron Microprobe Studies of Density Separates of Martian Nakhilite Mil03346: Implications for Interpretation of Moessbauer Spectra Acquired by the Mars Exploration Rovers – 83
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Morrison, Jeffrey G**
Heuristic Automation for Decluttering Tactical Displays – 65
Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42
- Morrissey, Kevin M**
Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95
- Morton, Lawrence B**
Assessing the Adequacy of Coverage of Joint Command and Control in the Capstone Concept for Joint Operations – 49
- Mosca, Edoardo**
Control of Uncertain Systems under Constraints: Switching Horizon Predictive Control of Persistently Disturbed Input-Saturated Plants – 152
- Mount, Frances**
Human Space Flight – 186
- Mu, Li-li**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Mucci, Lorelei A**
Molecular and Clinical Predictors of Aggressive Prostate Cancer – 91
- Mullin-Splude, Bernadine**
The Experience of Community in Canadian Military Families: A Female Partners' Perspective – 144
- Munoz, M. J.**
Morale as a Protection Factor against Mission Related Stress – 135
- Murchie, S.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- Murray, R L**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- Mustard, J. F.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Myers, J.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Myers, Tereance A.**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Nadler, E**
Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4
- Nakamura, T.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Nakamura-Messenger, K.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
N-15-Rich Organic Globules in a Cluster IDP and the Bells CM2 Chondrite – 187
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Nakano, T.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Naparstek, Oshri**
Information Theoretic Radar Waveform Design for Multiple Targets – 164
- Narayanan, Sekharipuram R.**
Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81
- Nash, William P.**
Operational Stress Control and Readiness (OSCAR): The USA Marine Corps Initiative to Deliver Mental Health Services to Operating Forces – 134
- Nathal, Michael V.**
Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 31
- Nehorai, Arye**
Information Theoretic Radar Waveform Design for Multiple Targets – 164
Polarimetric Detection of Targets in Inhomogeneous Clutter – 72
Polarization Diversity for Detecting Targets in Inhomogeneous Clutter – 71
- Nelman-Gonzales, Mayra**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Neuberger, Bruce W**
Space Industry – 16
- Newville, M.**
L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
- Nguyen, Hoa G**
Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164
- Nguyen, Thuy D**
SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- Nguyen, Truong X.**
Radio Frequency Compatibility of an RFID Tag on Glideslope Navigation Receivers – 4
- Nickerson, Cheryl A.**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Niebuhr, David W**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Nikolova, Krasimira**
Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135
- Ning, Cun-Zheng**
Conversion of type of quantum well structure – 61
Conversion of Type of Quantum Well Structure – 64

- Niro, Philip J.**
Acute Effects of Battlefield-Like Stress on Cognitive and Endocrine Function of Officers from an Elite Army Unit – 127
- Niu, Xiaoji**
Development of an Intelligent and Hybrid Scheme for Rapid INS Alignment – 39
- Nori, Franco**
Quantum Computing Using Superconducting Qubits – 174
- Normandie, Richard W**
Environmental Assessment Golf Learning Center and Driving Range – 77
- Novosad, Ondrej**
Military Leader's Role in Psychological Support during Deployment – 137
- Nunes, Arthur**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- O'Brien, Catherine**
Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- Oehler, Dorothy Z.**
Ancient Hydrothermal Springs in Arabia Terra, Mars – 195
- Ogden, Hilary**
Therapeutic Implications of Progesterone Receptor-Mediated Regulation of Cell Cycle in Breast Cancer – 101
- O'hara, Catherine M.**
An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- Ohsumi, Kazumasa**
Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Oleson, Roslyn S**
Wireless Cooperative Networks: Self-Configuration and Optimization – 66
- O'neY, R. D.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
- Olwell, David H**
Modeling & Simulation Education for the Acquisition and T&E Workforce: FY07 Deliverable Package – 158
- O'Neil, David**
NASA's M and S Accreditation Process Plan and Specification for Space Exploration – 195
- Oshle, Edward**
3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71
- Oswald, Jay J.**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Ott, C. Mark**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Incidence of Latent Virus Shedding during Space Flight – 111
- Ouellet, David**
Opening Up Architectures of Software-Intensive Systems: A First Prototype Implementation – 154
- Opening up Architectures of Software-Intensive Systems: A Functional Decomposition to Support System Comprehension – 153
- Owens, D. Bruce**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- Owens, Thomas J**
Survey of Event Processing – 183
- Pacis, E B**
Layered Augmented Virtuality – 165
- Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
- Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- Packnett, Elizabeth**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Padgett, Katie**
Effects of Personal Helicopter Oxygen Delivery System (PHODS) Nasal Canula Installation on the Lateral Impact Protection of the HGU-56/P Aircrew Integrated Helmet System (AIHS) – 145
- Painting, Kristen**
Generation Y Perspectives – 176
- Pakmehr, Mehrdad**
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Palma, R. L.**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Palosz, Witold**
Eastern European Science Needs Sweeping Changes – 89
- Pan, Ching-Tsai**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
- Pan, Nang-Fei**
Forecasting Bridge Deck Conditions Using Fuzzy Regression Analysis – 41
- Papandreou-Suppappola, A**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- Papandreou-Suppappola, Antonia**
Waveform-Agile Tracking In Heavy Sea Clutter – 72
- Papanyan, Valeri**
3D Position and Velocity Vector Computations of Objects Jettisoned from the International Space Station Using Close-Range Photogrammetry Approach – 71
- Parekh, Vaishali I**
5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Park, Soo-Young**
Preparation, Electromechanical, and Structural Study of Carbon Nanotube/Gelatin Nanocomposites – 29
- Parrish, Clyde F.**
Process for Self-Repair of Insulation Material – 25
- Process for self-repair of insulation material – 33
- Passner, Jeffrey E**
Evaluation and Application of the Weather Research and Forecast Model – 88
- Patterson, Michael J.**
NEXT Ion Propulsion System Development Status and Performance – 23
- Payton, Lewis N.**
Friction stir weld tools – 74
- Friction Stir Weld Tools – 75
- Peay, Chris S.**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- Peck, Mason A**
CUSat: An End-to-End In-Orbit Inspection System University Nanosatellite Program – 17
- Pedley, Michael**
Spacecraft Materials in the Space Flight Environment: International Space Station - May 2002 to May 2007 – 19
- Peng, Cheng**
Estimation of Percentage of Electrogastrogram Slow Wave Rhythm – 89
- Penn, Benjamin G.**
Bulk Crystal Growth of Piezoelectric PMN-PT Crystals Using Gradient Freeze Technique for Improved SHM Sensors – 35
- Pepin, R. O.**
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
- Perchonok, M. H.**
Thermostable Shelf Life Study – 103
- Perchonok, Michele**
Comparative Packaging Study – 36
- Effect of Processing and Subsequent Storage on Nutrition – 103

- Perepezko, John H**
Nanostructured Shape Memory Alloys: Adaptive Composite Materials and Components – 32
- Perez, Sondar A.**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
- Perka, Alan**
Lunar Outpost Technologies Breakeven Study – 145
- Perkins, Henry**
Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003 – 87
- Perotti, Jose**
Wireless Instrumentation System and Power Management Scheme Therefore – 64
- Peslier, A. H.**
Petrology and Mineral Chemistry of New Olivine-Phyric Shergottite RBT04262 – 82
- Peterman, Connie L.**
Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- Petersen, Walter A.**
Diurnal Variability of Vertical Structure from a TRMM Passive Microwave 'Virtual Radar' Retrieval – 80
- Petrie, Stefanie**
Early Interventions after Critical Incidents - Application – 138
- Pezeshki, Ali**
Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings – 181
- Pezeshkian, Narek**
Unmanned Ground Vehicle Radio Relay Deployment System For Non-Line-Of-Sight Operations – 164
- Pfleiderer, Elaine M**
Time Series Analyses of Integrated Terminal Weather System Effects on System Airport Efficiency Ratings – 13
- Philipp, Mario T.**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Phillips, Tiffany**
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
- Pickett, Lynn**
Human Factors Engineering Standards at NASA – 147
NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 182
- Pierson, Duane L.**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
Incidence of Latent Virus Shedding during Space Flight – 111
- Pierson Duane L.**
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
- Pierson, Duane**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Platts, Steven H.**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121
- Pontikakis, Manos**
Data Mining SIAM Presentation – 161
- Poot, G. J. A.**
Supporting Military Families - A Comparative Study in Social Support Arrangements for Military Families (Theoretical Dimensions and Empirical Comparison between Countries) – 126
- Poplawski, Joseph V.**
Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75
- Popov, Serguei**
Novel Therapeutic and Prophylactic Modalities to Protect the USA Armed Forces Against Mayor Biological Threat Agents – 98
- Porter, Richard**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- Pottier, Eric**
Advanced Polarimetric Concepts - PART 1 (Polarimetric Target Description, Speckle filtering and Decomposition Theorems) – 60
Advanced Polarimetric Concepts - PART 2 (Polarimetric Target Classification) – 59
- Poulet, F.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- Powell, Mark D**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Powers, Peter**
Characterization of Temperature Dependent Index of Refraction and Thermo-Optic Coefficient for InAs and InSb (Preprint) – 29
- Powers, Timothy E**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Pratt, Jerry E**
Exploiting Inherent Robustness and Natural Dynamics in the Control of Bipedal Walking Robots – 163
- Prefontaine, Anne**
Looking After the Clinical and Social Support Needs of Military Families Impacted by Operational Stress Injuries – 134
- Prettyman, T. H.**
K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83
- Priestley, K. J.**
Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 86
- Puente, Jose**
The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- Putcha, Lakshmi**
A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123
- Qi, Fa-ren**
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Qin, Feng-hua**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Qin, Li-feng**
Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148
- Qualls, Garry D.**
Reconstruction of the Genesis Entry – 21
- Quattrochi, Dale a.**
Introduction to the Special Session on Thermal Remote Sensing Data for Earth Science Research: The Critical Need for Continued Data Collection and Development of Future Thermal Satellite Sensors – 22
- Quiniarte, Heather**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
- Quinn, Jacqueline**
Removal of PCB and Other Halogenated Organic Contaminants found in Ex Situ Structures – 27

- Removal of PCB and other halogenated organic contaminants found in ex situ structures – 81
- Quiarte, Heather**
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Rajulu, Sudhakar**
Applications of Human Factors in Space – 147
Derivation of Boundary Manikins: A Principal Component Analysis – 146
Functional Mobility Testing: A Novel Method to Establish Human System Interface Design Requirements – 148
Population Analysis: Communicating in Context – 147
- Rakhmanov, A**
Quantum Computing Using Superconducting Qubits – 174
- Ramachandran, N.**
Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
- Ramamurthy, Rajee**
Closing the Phenotypic Gap between Transformed Neuronal Cell Lines in Culture and Untransformed Neurons – 91
- Ranasinghe, K. S.**
Containerless Processing of a Lithium Disilicate Glass – 24
- Raney, Jim**
Overview of AVIRIS Acquisitions in Argentina as Part of the NM EO-1 Campaign in 2001 – 70
- Rathz, T.**
Containerless Processing of a Lithium Disilicate Glass – 24
- Ray, C. S.**
Containerless Processing of a Lithium Disilicate Glass – 24
Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
In-Situ Crystallization of a Lithium Disilicate Glass--Effect of Pressure on Crystal Growth Rate – 24
- Ray, David M.**
High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- Ray, Ronald J.**
Autonomous Formation Flight: Project Overview – 1
- Redding, David C.**
An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- Rehak, Lisa**
Review of Collaborative Tools for Planning and Engineering – 159
- Reifman, Jaques**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- Reinersman, Phillip N.**
Method and program product for determining a radiance field in an optical environment – 175
- Reniers, Ad**
Modeling of Hurricane Impacts – 87
- Reschke, Millard F.**
Neuroscience in Space – 123
- Reschke, Millard**
Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111
- Revilock, Duane**
High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- Ribeiro, Christine**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
- Ribeiro, L. Christine**
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
- Rice, A. J.**
Foot Reaction Forces during Long Duration Space Flight – 109
- Rice, J. W.**
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- Rice, Jeffrey S**
Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95
- Richardson, Donald**
Combining Clinical Treatment and Peer Support: A Unique Approach to Overcoming Stigma and Delivering Care – 128
- Riddle, Mark S.**
Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142
- Rieger, Gabe**
Human Research Program Requirements Document – 115
- Righter, K.**
Evolution of Indarch (EH4 Chondrite) at 1 GPa and High Temperature – 192
L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
Partitioning of Phosphorus and Molybdenum between the Earth's Mantle and Core and the Conditions of Core Formation – 78
Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188
Siderophile Element Depletion in the Angrite Parent Body (APB) Mantle: Due to Core Formation? – 192
- Righter, M.**
Relationships Between HED's, Mesosiderites, and Ungrouped Achondrites: Trace Element Analyses of Mesosiderite RKPA 79015 and Ungrouped Achondrite QUE 93148 – 188
- Robertson, Gregory D**
Applying Knowledge Management Theory to Army Doctrine Development: Case Study of a Web-Based Community of Practice – 182
- Robichaud, Raymond M**
Marine Mammals and Active Sonar – 172
- Robinson, Julie A.**
The Crew Earth Observations Experiment: Earth System Science from the ISS – 79
- Robinson, Scott B**
Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94
- Rodionov, D.**
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
- Rodriguez, M. C.**
Genesis Concentrator Target Particle Contamination Mapping and Material Identification – 77
Preliminary Quantification of Image Color Gradient on Genesis Concentrator Silicon Carbine Target 60001 – 184
Stereomicroscope Inspection of Polished Aluminum Collector 50684.0 – 193
- Roelvink, Dano**
Modeling of Hurricane Impacts – 87
- Rogers, Andrew R**
Space Industry – 16
- Rogers, J. R.**
Containerless Processing of a Lithium Disilicate Glass – 24
- Rogers, John**
Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166
- Rogers, Paul B.**
Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- Rogers, Rodney O**
Preliminary Results of an Experiment to Evaluate Transfer of Low-Cost, Simulator-Based Airplane Upset-Recovery Training – 3
- Root, Lawrence E.**
Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75
- Rubin, David M**
Coastal Sediment Transport Models and Mixed Particle Size Dynamics – 164

- Russell, Carolyn**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- Russo, Dane**
Human Factors Engineering Standards at NASA – 147
- Rynne, Ed**
Source Array Support for Continuous Monitoring of Fish Population and Behavior by Instantaneous Continental-Shelf-Scale Imaging Using Ocean-Waveguide Acoustics – 172
- Sacks, Richard D.**
Thermal modulation for gas chromatography – 62
- Sacksteder, Kurt R.**
NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- Safonov, Michael G.**
Data-Driven Robust Control Design: Unfalsified Control – 151
- Saile, L. G.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Sakamoto, K.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Samelson, Roger M**
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163
- Sams, Clarence**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Sanders, B**
Experimental Validation of Source Temperature Modulation Via a Thermal Switch in Thermal Energy Harvesting (Preprint) – 67
- Sanders, Brian P**
Topology Synthesis of Distributed Actuation Systems for Morphing Wing Structures (Postprint) – 2
- Sanders, Gerald B.**
NASA In-Situ Resource Utilization (ISRU) Technology and Development Project Overview – 194
- Sanders, John W.**
Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142
- Sandford, S. A.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Sandor, A.**
Information Presentation – 146
- Sandor, Aniko**
Human Factors in Human-Systems Integration – 150
- Santee, William R**
Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94
- Sargsyan, A. E.**
Validation of On-Orbit Methodology for the Assessment of Cardiac Function and Changes in the Circulating Volume Using Ultrasound and 'Braslet-M' Occlusion Cuffs – 115
- Satcher, J. H.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
- Sato, Yoshinobu**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38
- Savel'ev, S**
Quantum Computing Using Superconducting Qubits – 174
- Saville, P**
Optimisation of Dallenbach Layers Using Real Materials – 171
- Sawka, Michael N**
Reflective Inserts to Reduce Heat Strain in Body Armor: Tests With and Without Irradiance – 94
- Schaubert, Daniel**
Proceedings of the 2007 Antenna Applications Symposium, Volume 1 – 68
Proceedings of the 2007 Antenna Applications Symposium. Volume 2 – 68
- Schenning, Amanda M**
Evaluation of ToxTrak (Trademark) for Analysis of Protein Toxin Toxicity – 95
- Schilling, Herbert W.**
Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- Schlgel, Todd T.**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110
- Schmidt, M. E.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- Schmitt, Chris**
Failure of the Trailing Umbilical System Disconnect Actuator on the International Space Station – 66
- Schmorrow, Dylan D**
Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42
- Schneider, Judy**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- Schneider, Rich**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Schoenborn, Oliver**
AIMSsim Version 2.2.1, User Manual – 157
Herc SAR Task 106: AIMS Feature Development – 156
- Schoenenberger, Mark**
Reconstruction of the Genesis Entry – 21
- Schofield, Oscar**
Novel Acoustic Techniques for Assessing Fish Schooling in the Context of an Operational Ocean Observatory – 28
- Schroder, C.**
An East to West Mineralogical Trend in Mars Exploration Rover Spirit Moessbauer Spectra of Home Plate – 191
Analysis of 6.4 KEV Moessbauer Spectra Obtained with MIMOS II on MER on Cobbles at Meridiani Planum, Mars and Considerations on Penetration Depths – 85
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- Schroder, T. M.**
Thermal Structure of the TTL and Its Relation to Stratospheric-Tropospheric Exchange of Water – 86
- Schroeder, C.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Schroeder, David**
An International Survey of Maintenance Human Factors Programs – 8
- Scott, Christine T**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Scott, Roydon**
How to TRiM Away at Post Traumatic Stress Reactions: Traumatic Risk Management - Now and in the Future – 133
- Scully, Marlan O**
Quantum Optics Initiative – 73
- Seaton, Kimberly A.**
Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124
Cognitive Functioning in Long Duration Head-down Bed Rest – 109
- Seelos, F. P.**
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189

- Seifert, Jeffrey W**
Data Mining and Homeland Security: An Overview – 179
- Seng, Jocelyn**
News Media Industry – 180
- Serrador, J. M.**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110
- Sesto, Juan R**
Marine Mammals and Active Sonar – 172
- Shackelford, K.**
Life Sciences Data Archive (LSDA) – 103
- Shackelford, S A**
Liquid State Thermochemical Decomposition of Neat 1,3,5,5-Tetranitrohexahydropyrimidine (DNNC) and its DNNC-d2, DNNC-d4, DNNC-d6 Structural Isotopomers: Mechanistic Entrance into the DNNC Molecule (Preprint) – 28
- Sharpley, John G.**
Pre-Operational Stress Briefing: Does it have any Effect? A Comparison of Royal Naval and Royal Marine Personnel Receiving a Pre-Operational Stress Briefing with a Group of Personnel who did not – 133
- Shcheglov, Kirill V.**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- Sherwood, Christopher R**
Coastal Sediment Transport Models and Mixed Particle Size Dynamics – 164
- Sheu, Tsang-Ling**
A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40
- Shieh, Ce-Kuen**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Shinohara, C.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Shoemaker, David G**
Close Air Support Command and Control at the Operational Level – 50
- Sidick, Erkin**
An Adaptive Cross-Correlation Algorithm for Extended-Scene Shack-Hartmann Wavefront Sensing – 71
- Sights, B**
Layered Augmented Virtuality – 165
Modular Robotic Intelligence System Based on Fuzzy Reasoning and State Machine Sequencing – 155
Sensor Fusion for Intelligence Behavior on Small Unmanned Ground Vehicles – 164
- Signell, Richard P**
Measurements of Storm and Nonstorm Circulation in the Northern Adriatic: October 2002 Through April 2003 – 87
- Sildam, Juri**
A Novel Detector of Broadband Transient Signals – 72
- Sills, Joel W.**
Cargo Integration Products for External Release – 14
- Sils, Ingrid V**
Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- Simon, D**
Sequential MCMC Estimation of Nonlinear Instantaneous Frequency – 168
- Simon, Terrence W.**
Validation of Multi-Dimensional Stirling Engine Design Codes: Measurements in the 90-Degree Turn Test Section – 75
- Simon, Thomas M.**
In-situ Resource Utilization (ISRU) to Support the Lunar Outpost and the Rationale for Precursor Missions – 195
- Sipes, Walter A.**
Behavioral and Psychological Issues in Long Duration Head-down Bed Rest – 124
Cognitive Functioning in Long Duration Head-down Bed Rest – 109
- Sira, Sandeep P**
Waveform-Agile Tracking In Heavy Sea Clutter – 72
- Skillen, Michael D.**
Modeling and Optimization for Morphing Wing Concept Generation II – 6
Morphing Wing Weight Predictors and Their Application in a Template-Based Morphing Aircraft Sizing Environment II – 6
- Skytland, Nicholas**
Generation Y Perspectives – 176
- Slack, Kelley J.**
Cognitive Functioning in Long Duration Head-down Bed Rest – 109
- Slinn, Donald N**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Smallman, Harvey S**
Heuristic Automation for Decluttering Tactical Displays – 65
- Naive Realism in Terrain Appreciation – 169
- Smialek, James L.**
Low Density, High Creep Resistant Single Crystal Super Alloy for Turbine Airfoils – 31
- Smith, Ian**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Smith, K A**
Solid-State Nuclear Magnetic Resonance Investigations of Microwave Tube Cathode Structure – 66
- Smith, Pace**
Efficient Pathfinding in Very Large Data Spaces – 159
- Smith, P.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Smith, Randy**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- Smith, Scott M.**
Changes in Calcium Metabolism during Space Flight – 122
- Smith, William L.**
Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- Smits, Jan M.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Sneddon, Kirk**
High Pressure Composite Overwrapped Pressure Vessel (COPV) Development Tests at Cryogenic Temperatures – 23
- Snyder, Chris**
Boundary Conditions, Data Assimilation, and Predictability in Coastal Ocean Models – 163
- Soderberg, Eric**
Data Mining and Information Technology: Its Impact on Intelligence Collection and Privacy Rights – 179
- Soeters, J. M. L. M.**
Stress Training and the New Military Environment – 142
- Sondel, Paul M**
Use of Bifunctional Immunotherapeutic Agents to Target Breast Cancer – 98
- Sothmann, M.**
The Interaction of the Space Shuttle Launch and Entry Suits and Sustained Weightless on Astronaut Egress Locomotion – 149

- Squyres, S. W.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Srinivasan, Ravi**
JBoss Middleware for Spacecraft Trajectory Operations – 160
- Srivastava, Ashok**
Data Mining SIAM Presentation – 161
- St John, Mark**
Heuristic Automation for Decluttering Tactical Displays – 65
Overview of the DARPA Augmented Cognition Technical Integration Experiment – 42
- Stanley, Rachel H R**
A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production From Five Noble Gases and Tritogenic Helium-3 – 30
- Starkey, Blythe A.**
International Space Station Medical Project – 113
- Stefanov, William L.**
The Crew Earth Observations Experiment: Earth System Science from the ISS – 79
- Stein, Sydney P.**
Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121
- Steinetz, Bruce M.**
Experimental Investigation of Elastomer Docking Seal Compression Set, Adhesion, and Leakage – 75
- Stenger, Michael B.**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
Gender Differences in Bed Rest: Preliminary Analysis of Vascular Function – 121
Midodrine as a Countermeasure for Post-Spaceflight Orthostatic Hypotension – 121
- Stensrud, Kjell**
JBoss Middleware for Spacecraft Trajectory Operations – 160
- Stepo, Pavol**
Commander - Unit Psychologist: A Powerful Tandem – 137
- Stewart, Kristine**
Thermal modulation for gas chromatography – 62
- Stewart, R. L.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Stone, L. S.**
Information Presentation – 146
- Stovas, M V**
The Irregularity of the Earth's Rotation as a Planetary Geomorphological and Geotectonic Factor – 83
- Stowe, Raymond**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
Plasma Cytokine Levels in Astronauts Before and after Spaceflight – 112
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Strganac, Thomas W**
Physics-Based Aeroelastic Analysis for Future Air Vehicle Concepts Using a Fully Nonlinear Methodology – 7
- Strong, Edward**
Test and Verification Approach for the NASA Constellation Program – 11
- Stroud, Kenneth**
NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 182
- Stumpf, Annette**
LEED (Trademark) for Homes - Pilot Study: Evaluation for Use in Army Family Housing – 154
- Su, Hong-yu**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Su, Quan**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Su, Tung-Ching**
An Optimization Model of Sewage Rehabilitation – 37
- Sudom, Kerry**
PERSTEMPO in the Canadian Forces: The Role of Coping and Cohesion in the Relationship between Job Stress and Morale – 137
- Suites, Michael**
A Decade of Friction Stir Welding R and D at NASA's Marshall Space Flight Center and a Glance into the Future – 31
- Sullivan, Thomas A.**
Method for nanoencapsulation of aerogels and nanoencapsulated aerogels produced by such method – 24
- Summers, Richard**
Cardiovascular Adaptations to Long Duration Head-Down Tilt Bed Rest – 114
- Sun, Bo**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Sun, Meng-jie**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Sun, Min**
Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175
- Sun, Xi-qing**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Sun, Xue-chuan**
Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90
- Surrador, Antonio Alberto**
Portuguese Armed Forces in the International Security and Assistance Force in Afghanistan: Psychological Support for the Command of Kabul International Airport – 141
- Sutter, B.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
Phoenix Lander's Thermal Evolved Gas Analyzer: Differential Scanning Calorimeter and Mass Spectrometer Database Development – 22
- Sutton, S.**
L-Edge Xanes Measurements of the Oxidation State of Tungsten in Iron Bearing and Iron Free Silicate Glasses – 78
- Swayze, G.**
Clay Bearing Units in the Region around Mawrth Vallis: Stratigraphy, Extent, and Possible Alteration Fronts – 191
- Switzer, G.**
Deployment Support - Strength through Partnership – 138
- Tabatabaie-Raissi, Ali**
Catalytic dehydrogenation of amine borane complexes – 26
- Talbot, R.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Tallman, Dennis**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Tamppari, L. K.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Tamura, Shinichi**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38

- Tang, Lei**
Study of Biomechanical Properties of Human Cervical and Lumbar Vertebral Segments – 116
- Tang, Yong-kang**
Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148
- Tao, Yong-zhen**
Study on Osteoblasts Growth on Opal Powder/Poly-L-Lactic Acid Composite Films – 108
- Taylor, Ivan**
Two Crowd Control Case Studies – 170
- Taylor, Larry**
Pulmonary Toxicity Studies of Lunar Dusts in Rodents – 104
- Taylor, Patrick**
Patterning of Bi₂Te₃ Polycrystalline Thin-Films on Silicon – 29
- Teng, Tsung-Jen**
The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48
- Tharion, William J**
A Fuzzy Logic Algorithm to Assign Confidence Levels to Heart and Respiratory Rate Time Series – 94
- Thaxton, Sherry**
Population Analysis: Communicating in Context – 147
- Theriault, Jim**
Marine Mammals and Active Sonar – 172
- Thiel de Vries, Jaap van**
Modeling of Hurricane Impacts – 87
- Thomas, D.**
Life Sciences Data Archive (LSDA) – 103
- Thomas, Jeffrey L.**
Leader Actions to Enhance Soldier Resilience in Combat – 140
- Thomas, Paige**
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
- Thomas, S.**
Development and Implementation of a Comprehensive Radiometric Validation Protocol for the CERES Earth Radiation Budget Climate Record Sensors – 86
- Thompson, Donald R**
Real-Time Forecasting System of Winds, Waves and Surge in Tropical Cyclones – 87
- Thompson, Megan M.**
Enhancing Mental Readiness in Military Personnel – 131
- Thompson, Robert J.**
A High Power Frequency Doubled Fiber Laser – 73
- Thompson, S. G.**
Information Presentation – 146
- Tian, Da-wei**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Tikuisis, Peter**
Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- Tillman, Barry**
Human Factors Engineering Standards at NASA – 147
Human Factors in Human-Systems Integration – 150
NASA Human Integration Design Handbook (HIDH): Revitalization of Space-Related Human Factors, Environmental, and Habitability Data and Design Guidance – 182
- Ting, Edward C.**
Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48
- Tinker, Michael L.**
The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 15
- Tippayawong, Nakorn**
Model Prediction of Indoor Particle Concentrations in a Public School Classroom – 47
- Tobiska, W. Kent**
Mitigating Orbit Planning, Satellite Operations, and Communication Surprises from Adverse Space Weather – 185
- Togawa, Y**
Quantum Computing Using Superconducting Qubits – 174
- Tolson, Robert H.**
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
- Tom, M.**
Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
- Tonomura, A**
Quantum Computing Using Superconducting Qubits – 174
- Toutanji, Houssam**
Sulfur 'Concrete' for Lunar Applications - Sublimation Concerns – 190
- Toy, S.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Tran, Nguyen**
Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120
- Treiman, A. H.**
Petrography and Origin of the Unique Achondrite GRA 06128 and 06129: Preliminary Results – 82
- Tsai, Hsien-Lung**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Tsai, Jeff H**
Evaluation of *Listeria Monocytogenes* Based Vaccines for HER-2/neu in Mouse Transgenic Models of Breast Cancer – 97
- Tsaur, Ding-Jyh**
Performance Modeling and Analysis of Parallel Packet Switches with Pao Queues – 149
- Tsuchiyama, A.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Tu, Meirong**
A High Power Frequency Doubled Fiber Laser – 73
- Tu, Qiu-fen**
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107
Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Tuma, Meg**
The Ares I-1 Flight Test--Paving the Road for the Ares I Crew Launch Vehicle – 15
- Turkov, Eugene**
Data Mining SIAM Presentation – 161
- Tyring, Stephen K.**
Incidence of Latent Virus Shedding during Space Flight – 111
- Uchakin, Peter**
Validation of Procedures for Monitoring Crewmember Immune Function – 109
- Uesugi, K.**
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Ungar, Eugene K.**
Current Issues in Human Spacecraft Thermal Control Technology – 192
- Usui, T.**
K/TH in Achondrites and Interpretation of Grand Data for the Dawn Mission – 83
- Vachon, Jake**
Autonomous Formation Flight: Project Overview – 1
Exploratory Investigation of Transport Vortex-Induced Performance Benefits on a Fighter Aircraft – 5

- Vachon, Paris W**
Evaluation of Simulated RADARSAT-2 Polarimetry Products – 72
- Vaksman, Zalman**
A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123
- Vallet, D.**
Exploratory Study on the State of Post-traumatic Stress in Two Operational Units of the Ground Army – 130
- Van Dyke, J D**
Preliminary Evaluation of the Properties of Dynamically Vulcanised Thermoplastic Rubbers – 34
- vandenBerg, Coen**
The Military Leaders Survey: NATO Military Leaders' Perspectives on Psychological Support on Operations – 136
- VanderMeulen, Ryan J**
Microstructure Evolution and Mechanical Properties of Severely Plastically Deformed (SPD) Aluminum Alloys – 32
- VanDuyne, Richard P**
MURI Center for Multidimensional Surface-Enhanced Sensing and Spectroscopy – 173
- Varnedoe, Tom**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- Vay, S.**
Rapid Convective Outflow from the U.S. to the Upper Troposphere over the North Atlantic during the NASA INTEX-NA Airborne Campaign: Flight 13 Case Study – 88
- Veronneau, Stephen J. H.**
Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- Vickerman, Mary B.**
Smagglce 2.0: Additional Capabilities for Interactive Grid Generation of Iced Airfoils – 9
- Vicroy, Dan D.**
Overview of Dynamic Test Techniques for Flight Dynamics Research at NASA LaRC (Invited) – 69
- Vidas, Timothy M**
SecureCore Software Architecture: Trusted Path Application (TPA) Requirements – 153
- Vincent, Dale S**
Asia Pacific Military Medicine Conference (APMMC) Simulation Symposium (16th) Held in New Delhi, India on March 26-31, 2006. Abstracts – 91
- Viswanathan, Tito**
Corrosion Prevention of Cold Rolled Steel Using Water Dispersible Lignosulfonic Acid Doped Polyaniline – 31
- Voels, Stephen A.**
Exploration System Mission Directorate and Constellation Program Support for Analogue Missions – 196
- Volponi, Allan J.**
Bootstrap data methodology for sequential hybrid model building – 12
- Volz, M. P.**
Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
- Wainberg, Zev**
Development of Antibodies Against Novel Cell Surface Proteins in Hormone Refractory Prostate Cancer – 99
- Waite, J. Hunter**
Thermal modulation for gas chromatography – 62
- Wallace, W. T.**
Lunar Dust and Lunar Simulant Activation and Monitoring – 193
- Walsh, Kevin**
Autonomous Formation Flight: Project Overview – 1
- Walstra, Dirk-Jan**
Modeling of Hurricane Impacts – 87
- Walton, M. E.**
The Integrated Medical Model: Statistical Forecasting of Risks to Crew Health and Mission Success – 114
- Wang, An-ling**
Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117
- Wang, An-xuan**
Calculation of the Electric Field and Potential Distributions of Six-needle Electrodes in Conductive Media (Biological Tissues) by Integral Equation Approach – 117
- Wang, Bing**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118
- Wang, Chau-Shing**
Modeling, Analyzing and Designing a Phase-Locked Battery Charger – 47
- Wang, Chung-Yue**
Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48
- Wang, Dan-dan**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Wang, Duhua**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Wang, Hong**
Relationship between Surface EMG and Angle of Elbow Joint – 108
- Wang, Huei Shun**
A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37
- Wang, Jing-hua**
Effects of Simulated Microgravity on the Morphology and Growth of Neurons – 119
- Wang, Li-ming**
An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105
- Wang, Ling**
Parameter Estimation of PCs via STFT Zooming and Phase Jump Mapping – 46
- Wang, Lu-jin**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Wang, P F**
A Partnership for Modeling the Marine Environment of Puget Sound, Washington - Puget Sound Naval Shipyard/Space and Naval Warfare Systems Center Report – 155
- Wang, Ren-cheng**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Wang, Shanomeng**
Structure-Based Design, Synthesis and Testing of Non-Peptide, Cell-Permeable, Potent Small Molecule Smac Mimetics as a New Therapy for Prostate Cancer. Revision – 96
- Wang, Shan-xiang**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Wang, Sheng-wei**
Relationship between Polymorphism of Pulmonary Surfactant Protein A Gene and Adaptation to Hypobaric Hypoxia – 90
- Wang, Shih-Hao**
An Efficient FGS to MPEG-1/2/4 Single Layer Transcoder with R-D Optimized Multi-Layer Streaming Technique for Video Quality Improvement – 46
- Wang, Shuguo**
Accuracy Analysis for Thickness Determination of Thin Sheet Structure under the Influence of Proximate Thin Sheet Structure Using MR Images – 38
- Wang, Xian-min**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Wang, Xi-ji**
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116

- Wang, Xiong**
Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120
- Wang, Yuan-Jay**
A Graphical Technique for Limit Cycle Analysis of Uncertain Nonlinear Control Systems – 43
- Wang, Yu-hui**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Wang, Zheng-rong**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Wang, Zhi-kui**
Space Medicine and Medical Engineering, Volume 20, No. 4 – 105
- Wang, Zuwei**
A Modified LC/MS/MS Method with Enhanced Sensitivity for the Determination of Scopolamine in Human Plasma – 123
- Ward, Ralph**
Electronics Industry – 65
- Warren, Jessica M**
Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle – 79
- Watkins, Anthony N.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Weaver, Nick**
Marine Mammals and Active Sonar – 172
- Webb, Schuyler C.**
Self-Reported Combat Stress among Troops Deployed to Iraq and Afghanistan: An Epidemiological Study – 142
- Weber, Natalya S**
AMSARA: Accession Medical Standards Analysis and Research Activity. Report of 2006 Attrition and Morbidity Data for 2005 Accessions – 95
- Webster, Dean**
Corrosion Protection of Al Alloys for Aircraft by Coatings With Advanced Properties and Enhanced Performance – 7
- Webster, Robert**
Advances in Autonomous Obstacle Avoidance for Unmanned Surface Vehicles – 166
- Wei, Che-Ho**
Throughput Performance of DMT-Based VDSL System at High Sampling Rates – 47
- Wei, Jin-he**
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Wei, Jyh-Yang**
Time Delay H(infinity) Control of Structures under Earthquake Loading – 44
- Wei-dang, Ai**
Development of a Space Ethylene Filter Prototype Facility for Use in Ground-based Experiments – 148
- Weng, Cheng Chiang**
A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37
- Wentzell, Tania E**
Gun Control for VBE-E: User Guide and Technical Description – 159
- Wessely, S.**
Deployment Experiences of British Army Wives Before, During and After Deployment: Satisfaction with Military Life and Use of Support Networks – 131
- Wessely, Simon**
Risk, Psychiatry and the Modern Military – 132
- Whinnery, James E.**
Development of an Aeromedical Scientific Information System for Aviation Safety – 3
- Whitnall, Mark H**
5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Wi, Jia-xue**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Wiberg, Dean V.**
Multiple internal seal right micro-electromechanical system vacuum package – 62
- Wicks, Michael C.**
Expert System Constant False Alarm Rate (CFAR) Processor – 53
Knowledge-Based Control for Space Time Adaptive Processing – 52
- Widerhold, Brenda K.**
Virtual Reality as a Tool in Early Interventions – 128
- Widerhold, Mark D.**
Virtual Reality as a Tool in Early Interventions – 128
- Wilkinson, M. Justin**
The Crew Earth Observations Experiment: Earth System Science from the ISS – 79
- Willcockson, William H.**
Anomalous Disturbance Torques during the Entry Phase of the Mars Exploration Rover Missions: A Telemetry and Mars-Surface Investigation – 193
- Willenberg, H.**
Hydrogen Reduction of Ilmenite from Lunar Regolith – 35
- Williams, Clare M**
Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments – 80
- Williams, Phillip A.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Willkomm, Bernd**
Preparing the German Air Force for Deployment - The Stress Concept of the General Surgeon – 127
- Wilson, Barry**
Marshall Space Flight Center Propulsion Systems Department (PSD) Knowledge Management (KM) Initiative – 177
- Wilson, David**
Time Series of RADARSAT-1 Fine Mode Images Using Sequential Coherent Target Monitoring Software – 157
- Wilson, J. R.**
Quiet Spike: Softening the Sonic Boom – 9
- Wilson, T. L.**
Are Fullerenes Relevant to Cosmochemistry? A New Finding – 178
GCR-Induced Photon Luminescence of the Moon – 191
- Wilton, Donald R.**
Evaluating the Gradient of the Thin Wire Kernel – 167
- Wincheski, Russell A.**
Carbon nanotube-based sensor and method for detection of crack growth in a structure – 62
- Winkelmann, Joseph P.**
Network device interface for digitally interfacing data channels to a controller via a network – 160
- Wiseman, S. M.**
Phyllosilicate and Hydrated Sulfate Deposits in Meridiani – 189
- Woida, R.**
Mars 2007 Phoenix Scout Mission Organic Free Blank: Method to Distinguish Mars Organics from Terrestrial Organics – 186
- Wolfson, Mike A**
Development of Mid-Frequency Multi-beam Sonar for Fisheries Applications – 173
- Wood, S. J.**
Effect of Vestibular Impairment on Cerebral Blood Flow Response to Dynamic Roll Tilt – 110
- Wood, Scott J.**
Human Ocular Counter-Rolling and Roll Tilt Perception during Off-Vertical Axis Rotation after Spaceflight – 111

- Using an Informative Missing Data Model to Predict the Ability to Assess Recovery of Balance Control after Spaceflight – 146
- Woods-Vedeler, Jessica A.**
2004 Space Report: Environment and Strategy for Space Research at NATO's Research and Technology Organisation (RTO) – 19
- Woolford, Barbara**
Human Space Flight – 186
- Wu, Bin**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
- Wu, Chin-Chi**
A Sliding-Window Parallel Packet Switch for High-speed Networks – 150
Performance Modeling and Analysis of Parallel Packet Switches with Piao Queues – 149
- Wu, Fang-fang**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Wu, I-Chen**
Transformation from IFC Data Model to GML Data Model: Methodology and Tool Development – 46
- Wu, Jiang**
Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Wu, Lien-Wen**
A Throughput Degradation Model under Multiple Consecutive Packet Losses for TCP-SACK – 40
- Wu, Tong-Yue**
Motion Analysis of 3D Membrane Structures by a Vector Form Intrinsic Finite Element – 48
- Wu, Xiao-ying**
Relationship between Surface EMG and Angle of Elbow Joint – 108
- Wu, Yan-hong**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118
- Wu, Zhong-chao**
Estimation of Percentage of Electrogas-trogram Slow Wave Rhythm – 89
- Xiao, Jing**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90
- Xiao, Mang**
5-Androstenediol Promotes Survival of Gamma-Irradiated Human Hematopoietic Progenitors Through Induction of NF-kappa B Activation and G-CSF Expression – 100
- Xie, Su-jiang**
Dynamic Changes of Ultrastructure and Elements of Otoconia during Repair and Regeneration Process in Guinea Pigs – 120
- Xu, Liang**
Tumor-Targeted Silencing of Bcl-2/Bcl-xl by Self-Assembled Sirna-Nanovectors as a Novel Molecular Therapy for Breast Cancer – 93
- Xu, Rong**
Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107
- Xu, Shu-xuan**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Xu, Xian-rong**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Xu, Xiaojiang**
Evaluation of Two Cold Thermoregulatory Models for Prediction of Core Temperature During Exercise in Cold Water – 95
- Xu, Zuobing**
Data Mining SIAM Presentation – 161
- Yan, Fu-lin**
Analysis and Comparative Study on Characteristics of Competent Astronauts – 117
- Yan, Guo-zheng**
Telemetric Localization of Detecting Capsule in Gastrointestinal Tract – 106
- Yan, Yan**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Yan, Zhuang-zhi**
An Automatic Algorithm for Image Segmentation in Urine Sediment Examination – 105
- Yanakiev, Yantsislav**
Psychological Dimensions of Effective Leadership and Duty Performance Before, During and After Deployment Abroad – 135
- Yang, Liuqing**
Wireless Cooperative Networks: Self-Configuration and Optimization – 66
- Yang, Ming-Der**
An Optimization Model of Sewage Rehabilitation – 37
- Yang, Rui Q.**
Interband cascade detectors – 176
- Yang, Zhi**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118
- Yau, Jong-Dar**
Elastic Stability of I-Columns Subjected to Compressions and BI-Moments – 41
- Ye, Da-tian**
Estimation of Percentage of Electrogas-trogram Slow Wave Rhythm – 89
- Ye, Shan**
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- Yee, Karl Y.**
Multiple internal seal right micro-electro-mechanical system vacuum package – 62
- Yeh, Chau-Shiung**
The Transition Matrix for the Scattering of Elastic Waves in a Half-Space – 48
- Yen, A. S.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
Pervasively Altered Hematite-Rich Deposits Southeast of Home Plate, Gusev Crater, Mars – 82
- Yen, A.**
The Hydrothermal System at Home Plate in Gusev Crater, Mars: Formation of High Silica Material by Acid-Sulfate Alteration of Basalt – 84
- Yen, Sheng I.**
A Relative Rigidity Approach for Design of Concrete-Encased Composite Columns – 37
- Yen, Shiao-Pin S.**
Water free proton conducting membranes based on poly-4-vinylpyridinebisulfate for fuel cells – 81
- Yetman, Deborah**
Immune Function Changes during a Spaceflight-Analog Undersea Mission – 113
- Yin, Hong**
Identify in Breast Cancer Stem Cell-Like Cells the Proteins Involved in Non-Homologous End Joining DNA Repair – 101
- Yin, Jihao**
Parameter Estimation of PCSs via STFT Zooming and Phase Jump Mapping – 46
- Yin, Q.-Z.**
Duration of a Magma Ocean and Subsequent Mantle Overturn in Mars: Evidence from Nakhilites – 189
- Yorktown, Ji Su**
Carbon Nanotube Reinforced Porous Carbon Having Three-Dimensionally Ordered Porosity and Method of Fabricating Same – 25
- Yost, A**
Use of Traffic Displays for General Aviation Approach Spacing: A Human Factors Study – 4

- Young, Der-Liang**
Journal of the Chinese Institute of Engineers, Volume 30, No. 4 – 37
Journal of the Chinese Institute of Engineers, Volume 30, Number 6. Transactions of the Chinese Institute of Engineers, Series A – 43
- Young, Karen**
Derivation of Boundary Manikins: A Principal Component Analysis – 146
- Yoshimura, Noboru**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Yu, Chang**
Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107
- Yu, Chi-Shan**
Removal of the Decaying DC Effects in Distance Protection by Simultaneously Considering the Voltage and Current Waveforms – 45
- Yu, Fei**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Yu, Meng-sun**
Harris Operator and K-means Clustering-based Facial Features Localization on Infrared Images – 175
Space Medicine and Medical Engineering, Volume 20, No. 5 – 116
- Yu, Shao-lei**
Effects of Psoralen on ADR Multidrug Resistance and Ca²⁺(+) Concentration in MCF-7/ADR Cells – 117
- Yu, Z G**
Photoexcited-Carrier-Induced Refractive Index Change in Small Bandgap Semiconductors (POSTPRINT) – 173
- Yuan, Xiu-gan**
An Analysis of Relation between Changes of Pupil and Mental Workloads – 119
- Zambon, A. C.**
Development of Comprehensive Reduced Kinetic Models for Supersonic Reacting Shear Layer Simulations – 27
- Zamorski, Mark A.**
Timing of Enhanced Post-Deployment Screening: Exploration of Participants' Preferences and of the Associations among Timing, the Prevalence of Health Problems, and the Likelihood of Referral – 140
- Zane-Ulman, Brett**
Data Mining SIAM Presentation – 161
- Zaretsky, Erwin V.**
Relation Between Hertz Stress-Life Exponent, Ball-Race Conformity, and Ball Bearing Life – 75
- Zha, Min**
Relationship between Surface EMG and Angle of Elbow Joint – 108
- Zhang, Bao**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Zhang, Chang-shui**
A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 116
- Zhang, Haitao**
New Strategy for Prostate Cancer Prevention Based on Selenium Suppression of Androgen Receptor Signaling – 100
- Zhang, Ji-chuan**
Effects of Vibration Noise under the Feet on Balancing Ability in Elder People – 107
- Zhang, Ju-liang**
Influence of Breast Cancer Infiltration Locations on Multi-frequency Impedance Characteristics – 108
- Zhang, Lei**
Effects of Uniaxial Stretch on Expressions of Collagens Type 1 and Type II in Rat Bone Mesenchymal Stem Cells – 120
- Zhang, Lian-yi**
Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90
- Zhang, Lu**
Influence of Circadian Rhythm Gene Clock on the Fertility of Male Mice – 105
- zhang, Shu**
Effects of Simulated Weightlessness on the Induction of ERK2 by Fluid Shear Stress in MG-63 Osteosarcoma Cells – 118
- Zhang, Ya-jing**
A Method for Real-time Detection of Binocular Rivalry through Electroencephalogram – 116
- Zhang, Yi**
Effects of Fluid Shear Stress on IL-8 mRNA Expression in EA. Hy926 Cells – 107
Mechano-chemical Signal Pathway of Endothelial Cells Migration Induced by Fluid Shear Stress – 107
Recellularization in Vitro of Blood Vessel Scaffold Based on Decellularized Canine Aorta – 121
- Zhao, Gang**
Viscoelastic Evaluating Guideline for Cryopreserved Arteries – 106
- Zhao, Jing-hui**
Expression, Purification of hClock (35-47) and Verification of Its Transmembrane Ability in Vitro – 90
- Zhao, Yan**
Synthesis and Implementation of Single and Multi-Vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques – 162
- Zhao, Zhuo**
Kinetics of Reaction between LiOH - H₂O and CO₂ – 119
- Zheng, Chong-xun**
Monitoring on Depth of Anesthesia Based on a Rhythm Autocorrelation of EEG Signals – 90
- Zheng, Jun**
Observation on Cardiovascular Damage in Pilots after Repeated + Gz Exposures – 118
- Zheng, Xiao-lin**
Relationship between Handgrip Forces and Surface Electromyogram Activities of Forearm Muscle – 107
Relationship between Surface EMG and Angle of Elbow Joint – 108
- Zhou, Daniel K.**
Case-Study of a Principal-Component-Based Radiative Transfer Forward Model and Retrieval Algorithm Using EAQUATE Data – 78
- Zhu, B Y**
Quantum Computing Using Superconducting Qubits – 174
- Zhu, Dongming**
Thermal Barrier and Protective Coatings to Improve the Durability of a Combustor Under a Pulse Detonation Engine Environment – 26
- Zipfel, J.**
Geochemical Properties of Rocks and Soils in Gusev Crater, Mars: APXS Results from Cumberland Ridge to Home Plate – 84
- Zolensky, M. E.**
Development of Improved Aerogels for Spacecraft Hypervelocity Capture – 33
New Manganese Silicide Mineral Phase in an Interplanetary Dust Particle – 187
Three-Dimensional Shapes and Impactor Size Estimation of Stardust Impact – 188
- Zolensky, M.**
Collisional Processing of Olivine and Pyroxene in Cometary Dust – 186
- Zolensky, Michael E.**
Crystallinity of Fe-Ni Sulfides in Carbonaceous Chondrites – 185
- Zwart, Sara R.**
Changes in Calcium Metabolism during Space Flight – 122