



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

**Scientific and Technical
Information Program Office**

Scientific and Technical Aerospace Reports

STAIR

WHAT'S INSIDE

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

NASA STI Program ... in Profile

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

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

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

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

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

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

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

Introduction

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

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

STAR includes citations to R&D results reported in:

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

The NASA STI Program

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

Through the NASA Center for AeroSpace Information (CASI), the NASA STI Program acquires, processes, archives, announces, and disseminates both NASA's internal STI and world-wide 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	5
04	Aircraft Communications and Navigation	8
05	Aircraft Design, Testing and Performance	9
06	Avionics and Aircraft Instrumentation	12
07	Aircraft Propulsion and Power	13
08	Aircraft Stability and Control	16
09	Research and Support Facilities (Air)	18

Astronautics

12	Astronautics (General)	19
14	Ground Support Systems and Facilities (Space)	19
15	Launch Vehicles and Launch Operations	20
16	Space Transportation and Safety	23
18	Spacecraft Design, Testing and Performance	30
19	Spacecraft Instrumentation and Astrionics	32
20	Spacecraft Propulsion and Power	32

Chemistry and Materials

23	Chemistry and Materials (General)	35
24	Composite Materials	40
25	Inorganic, Organic and Physical Chemistry	43
26	Metals and Metallic Materials	49
27	Nonmetallic Materials	53
28	Propellants and Fuels	58

Engineering

31	Engineering (General)	60
32	Communications and Radar	65
33	Electronics and Electrical Engineering	72
34	Fluid Mechanics and Thermodynamics	86
35	Instrumentation and Photography	92
36	Lasers and Masers	93
37	Mechanical Engineering	95
39	Structural Mechanics	96

Geosciences

42	Geosciences (General)	97
43	Earth Resources and Remote Sensing	98
44	Energy Production and Conversion	101
45	Environment Pollution	104
46	Geophysics	110
47	Meteorology and Climatology	111
48	Oceanography	115

Life Sciences

51	Life Sciences (General)	116
52	Aerospace Medicine	142
54	Man/System Technology and Life Support	143

Mathematical and Computer Sciences

59	Mathematical and Computer Sciences (General)	146
61	Computer Programming and Software	151
62	Computer Systems	158
63	Cybernetics, Artificial Intelligence and Robotics	168
64	Numerical Analysis	177
65	Statistics and Probability	190
66	Systems Analysis and Operations Research	195
67	Theoretical Mathematics	198

Physics

70	Physics (General)	201
71	Acoustics	211
72	Atomic and Molecular Physics	214
73	Nuclear Physics	214
74	Optics	216
75	Plasma Physics	225
76	Solid-State Physics	228
77	Physics of Elementary Particles and Fields	233

Social and Information Sciences

82	Documentation and Information Science	234
----	---------------------------------------	-----

Space Sciences

88	Space Sciences (General)	246
89	Astronomy	248
90	Astrophysics	260
91	Lunar and Planetary Science and Exploration	262
92	Solar Physics	266
93	Space Radiation	266

General

99	General	267
----	---------------	-----

Indexes

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

[**Subject Term Index**](#)

[**Personal Author Index**](#)

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 45, NUMBER 2

FEBRUARY 5, 2007

01

AERONAUTICS (GENERAL)

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

20070002557 Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 5, October 2006

Dewang, L.; Oct. 2006; 132 pp.; In Chinese

Report No.(s): PB2007-101881; Copyright; Avail.: National Technical Information Service (NTIS)

Contents: Key Technology and Prototype of Pulse Detonation Rocket Engine; Investigation on Muffler of Pulse Detonation Engines for Test Room; Unsteady Numerical Simulation of Transonic Fan with Casing Treatment; Dual-Shock Loss Model for Off-Design Performance Calculation of Fan/Compressor; Experimental Study and Numerical Simulation of Model Casing Containment; Parameter Selection in Micro-Flow Using DSMC Method; Numerical Study on Effects of Fluid Thermal Properties on Thermal Driving in Loop Small Channel in Centrifugal Field; Numerical Research of Tip-Clearance Effects of Rotor Transonic Fan; Second-Order Moment-EBU Model in Numerical Simulation of Two-Phase Reacting Flows; Analysis of Suction Roles for Supersonic Inlet on Combined Engine; Numerical Simulation for Heat Transfer Properties at Trailing Edge of Gas Turbine Airfoils; Numerical Simulation of Hypersonic Flow with Non-Equilibrium Chemical Reaction and Radiation; Influence of Boundary Condition on 3-D Cavity Flow-Induced Oscillations; Bi-Mode Alternation Stepping Ultrasonic Motors; Adjusting Traveling Wave Type Ultrasonic Motor Stator Modal Frequencies into Coincidence; Vibration Method for Measurement of Cable Tension; Lamb Wave Excitation Signal for Structural Health Monitoring on Composite Structures; Research on Airport Ground Capacity Evaluation; Fuzzy Control Algorithm for Manipulator Joint Trajectory Based on Multi-Constraints; Container Shipping AGV System Guided by Vision in the Ports; Experimental Study on High Speed Milling of Ti-6Al-4V Alloy with Nitrogen-Oil Mist; Five-Axis High Speed Milling Tool-path Calculation of Impeller Channel; Research on Simulation Test of Local Resonance Mechanism in Ultrasonic Machining; and Practical Photographic Oil Contamination Real-Time Measuring System.

NTIS

Aeronautics; Astronautics; Universities

20070002558 Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 4, August 2006

Dewang, L.; Aug. 2006; 138 pp.; In Chinese

Report No.(s): PB2007-100120; Copyright; Avail.: National Technical Information Service (NTIS)

Contents: Data Process and Domain Decomposition for 3D Unstructured Hybrid Mesh; Choosing Method for Aeroengine LQR Weighting; Optimized Design Approach for Internal Cooling Structure in Turbine Blades; Parallel Implementation and Computing Efficiency Analysis for NAPA Code; 2-D Numerical Simulation of Cooling Characteristics of Ventilated Rib in Electronic Equipments; Structure and Numerical Simulation of High-Order Accuracy Hybrid Scheme; Aeroacoustic Noise Signal Analysis on Helicopter Scissors Tail Rotor by Chaos Theory; Optimized Assignment of Civil Airport Gate; Movement Characteristic of UAV Folding Wings; Structural Dynamic Modeling of Multi-body System; New Algorithm for Feature Recognition of Reverse Engineering; Decomposition and Clustering of Product Architecture Based on Genetic Algorithms and DSM; Open Data Cleaning Frame; Meso-Mechanical Method for Estimating Equivalent Elastic Modulus of Foam-Solid with Double-Modulus; Numerical Verification of Quasi-Static Loading Model for Nonlinear Helical Buckling of Tubing in Constant-Curvature Wells; Crystallization Kinetics of Mg(sub 65)CU(sub 25)Y(sub 10) Amorphous Alloy; Design of Internal Control System in Active Queue Management; Characteristic Model Based Intelligent PID Controller for Attitude Control of Unmanned Air Vehicle; Semantics-Based Ontology Mapping Method; Accurate Algorithm on Source and Perfect Conductor

Boundary for ADI-FDTD; High Performance Display Control System for DSO; Two-Level-Loop Scheduling Model Based on Mobile Agent in Grid Environment; Novel Optimization Approach to Group Multicast Routing Problem; External Characteristics of Digital Control Inverter with Instantaneous Dual-Loop Feedback; Modeling and Simulation of Aircraft Automatic Distribution System; and Methodology of Multi Attribute Group Decision Making and Application in Employee Selection.

NTIS

Astronautics; Aeronautics; Universities

20070002584 Nanjing Univ. of Aeronautics and Astronautics, Nanjing, China

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 2, April 2006

Apr. 2006; 142 pp.; In Chinese

Report No.(s): PB2007-101882; Copyright; Avail.: National Technical Information Service (NTIS)

Contents: Modification to Basic Modes of Reduced Order Model for Computing Airfoil Flow Field; Calculating Method for Constant Load Noise of Helicopter Tail Rotor; Numerical Simulation of Non-Reactive Flow Field for Rotating Ramjet Ram-Compressed Rotor Disc Cavity; Local Heat Transfer Characteristics in 'Impingement Film' Cooling Style about Inner Side of Gas Turbine Blade; Experimental Study of Velocity Distribution for Synthetic Jet Driven by Piezoelectric Actuator; Output Tracking Controller Based on Fuzzy Set Data-Statistics; Improved Algorithm for Calculating GA Fitness Function of Aeroengine PID Controller Parameter Optimization; Generation Mechanism of DC Flow in Double-Inlet Pulse Tube Coolers; Heat Transfer Characteristics of Plate-Fin Evaporator on On-Board Vapor Cycle Cooling System; Experimental Investigation in Parachute Opening Process; Three-Stage Method for Airline Network Design; Evaluation Method for Maintenance Cost Target of New Civil Aircraft; Optimization Placement of Actuators/Sensors in Normal Modal Test; Fuzzy Control Method for Square Billet Blade Electrochemical Machining Process; Virtual Orientation of Lower and Upper Jaw Models Using CAD Technology; DOM-Based Algorithm of Mining Frequent Patterns from XML Data; Load Distribution Strategy in Distributed Data Stream Processing; Prediction of Network Traffic Flow Based on Chaos Characteristics; DNA Algorithm for Solution to Hamilton Cycle Problem; Hopfield Neural Network Routing Algorithm in Nongeostationary Satellite Communication Networks; Prediction of Composite Materials Properties Based on BP Algorithm of Artificial Neural Network; Preparation and Photo-catalytic Activity of Novel Magnetic Photocatalyst; Effect of Expansive Agent, Fiber or Their Combination on Freezing-Thawing Durability of High Performance Concrete; Effects of Different Expansive Agents on Mass Concrete Deformation Property; Effects of Floor Slab on High-Rising Hybrid Structure Performance; and Study on Equivalent Width Coefficient of Equivalent Beam in Flat Plate Structures Under Horizontal Force.

NTIS

Aeronautics; Astronautics; Universities

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.

20070002486 NASA Ames Research Center, Moffett Field, CA, USA

Computational Simulation of Semispan Wings in Wind Tunnels

Olsen, Mike; Rizk, Yehia; 1998; 1 pp.; In English; AIAA 36th Aerospace Sciences Meeting, Jan. 12-15. 1998, Reno, NV, USA

Contract(s)/Grant(s): RTOP 505-59-53; No Copyright; Avail.: Other Sources; Abstract Only

The computational modelling of experiments, with the end aim of providing sufficiently accurate simulations to assess and improve turbulence models is described. Solid wall tunnels are the only tunnels in which the boundary conditions can, in principle, be known exactly. The modelling of the tunnel walls for transonic flows requires the accurate modelling of the viscous displacement effects on the tunnel walls. This paper describes the modelling of semispan wing experiments in solid wall tunnels, with the tunnel walls modelled as inviscid walls, and with all 4 walls modelled viscously. The effect of the viscous effects is discussed, as well as the feasibility of modelling these effects in an inviscid, a priori manner.

Author

Wind Tunnels; Transonic Flow; Turbulence Models; Boundary Conditions; Computerized Simulation; Semispan Models

20070002487 NASA Ames Research Center, Moffett Field, CA, USA

Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils

Rai, Man Mohan; Madavan, Nateri; 1997; 1 pp.; In English; Pratt and Whitney Seminar, August 21, 1997, West Palm Beach, FL, USA

Contract(s)/Grant(s): RTOP 519-40-42; No Copyright; Avail.: Other Sources; Abstract Only

Artificial neural networks are widely used in engineering applications, such as control, pattern recognition, plant modeling and condition monitoring to name just a few. In this seminar we will explore the possibility of applying neural networks to aerodynamic design, in particular, the design of turbomachinery airfoils. The principle idea behind this effort is to represent the design space using a neural network (within some parameter limits), and then to employ an optimization procedure to search this space for a solution that exhibits optimal performance characteristics. Results obtained for design problems in two spatial dimensions will be presented.

Author

Design Analysis; Turbomachinery; Neural Nets; Airfoils; Aerodynamics

20070003250 Bihrl Applied Research, Inc., Hampton, VA USA

Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135

Dickes, Edward G; Gingras, David R; Hultbert, Randy S; Kloc, Stefan J; Dec 2002; 40 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F33615-98-D-3601-0009; Proj-A00T

Report No.(s): AD-A459237; BAR02-06; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459237>; Avail.: CASI: A03, Hardcopy

An experimental investigation was conducted in the Langley Full Scale Tunnel (LFST) to collect the data necessary to model the effects of the wake of a KC-135 tanker on the aerodynamics of a similar scale UCAV-like aircraft (ICE101 configuration) in a refueling scenario. The primary efforts of this task were to measure the aerodynamic forces and moments on the ICE101 model in the presence of the KC-135 wake and then create aerodynamic increments for use in taking and formation simulation. A secondary undertaking was to conduct a flow survey behind the KC-135 model to quantify its wake characteristics.

DTIC

Aerodynamic Forces; C-135 Aircraft; Combat; Computerized Simulation; Refueling

20070003327 Arizona Univ., Tucson, AZ USA

Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS

Fasel, Hermann F; Sandberg, Richard D; Oct 2006; 342 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0361

Report No.(s): AD-A459372; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459372>; Avail.: CASI: A15, Hardcopy

Transitional and turbulent supersonic axisymmetric wakes were investigated by conducting various numerical experiments. The main objective was to identify hydrodynamic instability mechanisms in the flow at Mach number $M = 2.46$ for several Reynolds numbers, and relating these to coherent structures that are found from various visualization techniques. The premise for this approach is the assumption that flow instabilities lead to the formation of coherent structures. The effect of these structures on the mean flow is of particular interest, as they strongly affect the base drag. Three high-order accurate compressible codes were developed in cylindrical coordinates for this research: A spatial Navier-Stokes (N-S) code to conduct Direct Numerical Simulations (DNS), a linearized N-S code for linear stability investigations using two-dimensional basic states, and a temporal N-S code for performing local stability analyses. The ability of numerical simulations to deliberately exclude physical effects is exploited. With this approach, the impact of structures associated with certain modes on the global wake-behavior can be scrutinized. It is concluded that azimuthal modes with low wavenumbers are responsible for a flat mean base-pressure distribution and that $k=2$ and $k=4$ are the dominant modes in the trailing wake, producing a four-lobe wake pattern. Circumstantial evidence is presented that absolutely unstable global modes within the recirculation region coexist with convectively unstable shear-layer modes. The flow is found to be absolutely unstable with respect to modes $k \geq 0$ for $Re_D \geq 5,000$ and with respect to the axisymmetric mode for $Re_D \geq 100,000$. Furthermore, it is investigated whether flow control measures designed to weaken the naturally most significant modes can decrease the base drag. Finally, the novel Flow

Simulation Methodology (FSM), using state-of-the-art turbulence closures, was shown to reproduce DNS results at a fraction of the computational cost.

DTIC

Computerized Simulation; Direct Numerical Simulation; Simulation; Supersonic Flow

20070003476 NASA Ames Research Center, Moffett Field, CA, USA, Sterling Software, Inc., Palo Alto, CA, USA

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor

Wadcock, Alan J.; [1997]; 3 pp.; In English; AHS Technical Specialists Meeting, 28-30 Oct. 1997, Williamsburg, VA, USA; Original contains black and white illustrations

Contract(s)/Grant(s): RTOP 538-07-14; Copyright; Avail.: CASI: [A01](#), Hardcopy

Detailed hot wire measurements have been acquired in the tip vortex of a three-bladed model tilt rotor in hover. Testing was conducted at a rotor tip speed of 752 ft/sec, a Reynolds number (based on blade tip chord) of 1.77×10^6 , for thrust coefficients up to 0.0160. A figure shows the hot wire mounted above the inverted rotor at the Outside Aerodynamic Rotor Facility (OARF) at NASA Ames Research Center. Strobed shadowgraph flow visualization was used to define the vortex trajectory as an aid in hot wire positioning. Considerable variations in tip vortex structure with time were observed, even from the same blade, under essentially uniform test conditions. The only velocity signatures analyzed were those corresponding to passage of the probe directly through the center of the vortex. These time histories were ensemble averaged after compensating for jitter in the vortex arrival time at the probe, thereby retaining the core structure with minimal smearing. An example of a mean velocity signature, after ensemble averaging, is shown. The mean velocity signature was analyzed under the assumption of constant (unknown) translation speed of the vortex filament past the fixed probe. The translation speed of the vortex is deduced and the vortex strength and core diameter inferred. The results were highly unexpected. The indicated vortex strength is seen to decrease rapidly after first blade passage. In addition, the core radius is seen to decrease with increasing wake age, not increase as might be expected from simple diffusion.

Derived from text

Hovering; Reynolds Number; Rotors; Tilt Rotor Aircraft; Vortices; Blade-Vortex Interaction

20070003495 NASA Langley Research Center, Hampton, VA, USA

Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications

Barrows, Danny A.; [2006]; 12 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 581.02.08.07.15.03

Report No.(s): AIAA Paper 2007-1163; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070003495>; Avail.: CASI: [A03](#), Hardcopy

Videogrammetric measurement technique developments at NASA Langley were driven largely by the need to quantify model deformation at the National Transonic Facility (NTF). This paper summarizes recent wind tunnel applications and issues at the NTF and other NASA Langley facilities including the Transonic Dynamics Tunnel, 31-Inch Mach 10 Tunnel, 8-Ft high Temperature Tunnel, and the 20-Ft Vertical Spin Tunnel. In addition, several adaptations of wind tunnel techniques to non-wind tunnel applications are summarized. These applications include wing deformation measurements on vehicles in flight, determining aerodynamic loads based on optical elastic deformation measurements, measurements on ultra-lightweight and inflatable space structures, and the use of an object-to-image plane scaling technique to support NASA's Space Exploration program.

Author

Elastic Deformation; Wind Tunnel Models; Photographic Measurement; Photogrammetry

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.

20070002140 General Dynamics Advanced Information Systems, Dayton, OH USA

Flare Cue Symbology for Zero-Zero Weather Landings

French, Guy A; Murphy, David M; Ercoline, William R; Mar 2006; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-7184

Report No.(s): AD-A458551; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458551>; Avail.: CASI: A03, Hardcopy

When flying an airplane, landing is arguably the most difficult task a pilot can do. This applies to pilots of all skill levels particularly as the level of complexity in both the aircraft and environment increase. Current navigational aids, such as an instrument landing system (ILS), do a good job of providing safe guidance for an approach to an airfield. These aids provide data to primary flight reference (PFR) displays on-board aircraft depicting through symbology what the pilot's eyes should be seeing. Piloting an approach under visual meteorological conditions (VMC) is relatively easy compared to the various complex instrument approaches under instrument meteorological conditions (IMC) which may include flying in zero-zero weather. Perhaps the most critical point in the approach is the transition to landing where the rate of closure between the wheels and the runway is%critical to a smooth, accurate landing. Very few PFR's provide this flare cue information. In this study we will evaluate examples of flare cueing symbology for use in landing an aircraft in the most difficult conditions. This research is a part of a larger demonstration effort using sensor technology to land in zero-zero weather at airfields that offer no or unreliable approach guidance. Several problems exist when landing without visual reference to the outside world. One is landing with a force greater than desired at touchdown and another is landing on a point of the runway other than desired. We compare different flare cueing systems to one another and against a baseline for completing this complex a roach task.
DTIC

Cues; Helmet Mounted Displays; Navigation Aids

20070002822 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Crossbow Air Launch Trade Space

Bonometti, Joseph A.; Sorensen, Kirk F.; [2006]; 18 pp.; In English; AIAA Space 2006 Conference, 19-21 Sep. 2006, San Jose, CA, USA; Original contains black and white illustrations

Report No.(s): AIAA Paper 2006-7277; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002822>; Avail.: CASI: A03, Hardcopy

Effective air launching of a rocket is approached from a broad systems engineering viewpoint. The elementary reasons for why and how a rocket might be launched from a carrier aircraft are examined. From this, a carefully crafted set of guiding principles is presented. Rules are generated from a fundamental foundation, derived from NASA systems study analyses and from an academic vantage point. The Appendix includes the derivation of a revised Mass Multiplier Equation, useful in understanding the rocket equation as it applies to real vehicles, without the need of complicated weight and sizing programs. The rationale for air launching, being an enormously advantageous Earth-To-Orbit (ETO) methodology, is presented along with the realization that the appropriate air launch solution may lie in a very large class of carrier aircraft; the pod-hauler. Finally, a unique area of the system trade space is defined and branded Crossbow. Crossbow is not a specific hardware design for air launch, but represents a comprehensive vision for commercial, military and space transportation. This document serves as a starting point for future technical papers that evaluate the air launch hypotheses and assertions produced during the past several years of study on the subject.

Author

Air Launching; Aircraft Carriers; Space Transportation; Systems Engineering; Commercial Aircraft

20070002905 Civil Aerospace Medical Inst., Oklahoma City, OK, USA

Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload

Manning, C. A.; Pfeiderer, E. M.; December 2006; 12 pp.; In English

Contract(s)/Grant(s): AM-HRR-524

Report No.(s): DOT/FAA/AM-06/29; No Copyright; Avail.: CASI: A03, Hardcopy

This study compared the relative effectiveness of two constructs, sector activity and sector complexity, in predicting air traffic controller taskload. Sector activity was defined as the activity associated with aircraft moving through the sector and was measured by counting the number of aircraft under the control of the sector during a traffic sample. Sector complexity describes a set of factors presumed to affect the difficulty experienced by a controller when controlling traffic. Sector complexity was measured in two ways. The first measure of complexity was a subjective rating made by supervisors and controllers to describe the complexity associated with specific traffic samples. The second was a composite variable that included measures reflecting several of the complexity variables found in the literature. Taskload was defined as controller activity and was measured by counting the number of data entries made by a controller during a traffic sample. The results appear to suggest that our hypothesis, that sector activity predicted controller taskload better than sector complexity, was incorrect. However, interpretation of these results depended on consideration of what each of the variables measured. The Complexity Rating predicted controller activity better than the number of aircraft alone, but the Complexity Value (based on a set of variables identified through previous research) did not contribute at all to that prediction. Additional analyses suggested that the Complexity Rating measured something very different than the Complexity Value. We believe that the Complexity Ratings estimated the workload that observers believed the controller at the sector experienced instead of the complexity of the situation. On the other hand, the complexity measures used here did not appear to be good measures of the construct. This may have occurred because the measures used in this study had limited variability or because they were not very good measures of the construct even though they were derived from factors identified in the literature as contributing to sector complexity. While we expected that the number of aircraft alone might be sufficient to predict controller activity/taskload, the results suggested that measuring both controller activity and extracting measures from other routinely recorded data might be necessary to develop more objective staffing standards used to determine how many controllers are needed to provide ATC services to individual facilities.

Author

Air Traffic Control; Air Traffic Controllers (Personnel); Workloads (Psychophysiology); Estimating; Hypotheses

20070002993 NASA Glenn Research Center, Cleveland, OH, USA

Global Energy and Aviation Concerns

Hendricks, Robert C.; Daggett, Dave; Anast, Peter; Lowery, Nathan; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 79-105; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Renewable energy sources are usually diffuse and require large facilities. Biofuels work better, are more economical to produce for ground transportation, but sharply increase competition for food croplands. Noble laureate Richard Smalley (deceased-2005) conceptual 20 TWe power generation covers hundreds x hundreds of miles. Combined with Fuller's superconducting power grid system would enable renewable planetary energy. A solar-wind project in Australia will have a 7km diameter collector interfacing with a 1 km tower to extract 200 MW from wind turbines mounted at the base. GE Energy's 3.5MW Wind Turbine is large and placing this in perspective, it is as if one were rotating a Boeing 747-200; the blade diameter is that large. Wind turbines are rapidly gaining popularity in Europe and photovoltaic (PV) is expected to also expand rapidly. It becomes clear that we need (and still have time) to develop new sources of energy. Hf 178 bombarded by X-rays produces Gamma-rays for heating. The reaction stops when the X-rays stop; the half life is about 30 years and seems manageable vs 30 000 years. Water splitting needs to be perused as do ultra fast ultra intense laser applications in terms of fusion and new materials developments including new ways to strip and re-bind hydrogen into fuels. New methods and tools for development are being found in quantum mechanical applications to macro-systems and need to be developed into a set of new tool boxes for development of these new energy sources.

Derived from text

Renewable Energy; Solar Wind; Accumulators; Surface Vehicles; Fuels; Superconductivity; Boeing 747 Aircraft

20070003151 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Reducing C-17 Pilot Training Delays

Moritz, Eric J; Jun 2004; 63 pp.; In English

Report No.(s): AD-A459040; AFIT/GMO/ENS/04E-12; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459040>;

Avail.: CASI: [A04](#), Hardcopy

The C-17 pilot training pipeline at Altus Air Force Base is perpetually behind schedule, straining financial and human resources. This research analyzes the extent, significance and sources of those delays. Additionally, the paper offers solutions to the predicament. This research examines most of the current databases used for tracking the flow and effectiveness of the different programs at Altus, including those employed by both training organizations, Boeing Aerospace and the 58th Airlift

Squadron. This paper includes some basic analysis regarding the numerical statistics contained within those databases and describes the consequences of those delays, both from a training and operational perspective. The emphasis is on two of the more-troubled courses, the Aircraft Commander Initial Qualification and the Instructor Aircraft Commander programs. Despite a slight improvement over previous years, those two programs still suffered from poor graduation timeliness in 2003. The sources of those delays include higher-than-expected student retraining rates and under-sourced aircraft allocations. Potential solutions range from adding and protecting aircraft resources to revising current database tracking methods. Other viable options include adjusting program timelines to reflect a more accurate training environment and overlapping simulator and flight training phases. Fortunately, significant improvement in the C-17 training arena can be harnessed with the acceptance of these relatively simple

DTIC

Armed Forces (United States); Flight Training; Military Personnel; Pilot Training; Pilots

20070003161 Mitre Corp., Bedford, MA USA

Tactical Data Links, Air Traffic Management, and Software Programmable Radios

White, B E; Jan 1999; 9 pp.; In English

Report No.(s): AD-A459059; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459059>; Avail.: CASI: A02,

Hardcopy

Background on Link 16, global air traffic management (GATM), and the joint tactical radio system (JTRS) is provided. Information addressing the ability of: 1) Link 16 to handle evolving civil aviation data link (CADL) waveforms; 2) a single data link to satisfy Air Force GATM requirements; and 3) JTRS to incorporate data links of interest to aviation is offered. Relationships with layered communication architectures, the Global Grid, and software programmable radios (SPRs) are also discussed.

DTIC

Air Traffic; Air Traffic Control; Computer Systems Programs; Data Links; Radio Equipment; Telecommunication

20070003490 NASA Langley Research Center, Hampton, VA, USA

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS

Viken, Jeff; Dollyhigh, Samuel; Smith, Jeremy; Trani, Antonio; Baik, Hojong; Hinze, Nicholas; Ashiabor, Senanu; [2006]; 24 pp.; In English; 11th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, 6-8 Sep. 2006, Portsmouth, VA, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 931.02.07.07.01

Report No.(s): AIAA Paper 2006-7032; Copyright; Avail.: CASI: A03, Hardcopy

The current work incorporates the Transportation Systems Analysis Model (TSAM) to predict the future demand for airline travel. TSAM is a multi-mode, national model that predicts the demand for all long distance travel at a county level based upon population and demographics. The model conducts a mode choice analysis to compute the demand for commercial airline travel based upon the traveler's purpose of the trip, value of time, cost and time of the trip. The county demand for airline travel is then aggregated (or distributed) to the airport level, and the enplanement demand at commercial airports is modeled. With the growth in flight demand, and utilizing current airline flight schedules, the Fratar algorithm is used to develop future flight schedules in the NAS. The projected flights can then be flown through air transportation simulators to quantify the ability of the NAS to meet future demand. A major strength of the TSAM analysis is that scenario planning can be conducted to quantify capacity requirements at individual airports, based upon different future scenarios. Different demographic scenarios can be analyzed to model the demand sensitivity to them. Also, it is fairly well known, but not well modeled at the airport level, that the demand for travel is highly dependent on the cost of travel, or the fare yield of the airline industry. The FAA projects the fare yield (in constant year dollars) to keep decreasing into the future. The magnitude and/or direction of these projections can be suspect in light of the general lack of airline profits and the large rises in airline fuel cost. Also, changes in travel time and convenience have an influence on the demand for air travel, especially for business travel. Future planners cannot easily conduct sensitivity studies of future demand with the FAA TAF data, nor with the Boeing or Airbus projections. In TSAM many factors can be parameterized and various demand sensitivities can be predicted for future travel. These resulting demand scenarios can be incorporated into future flight schedules, therefore providing a quantifiable demand for flights in the NAS for a range of futures. In addition, new future airline business scenarios are investigated that illustrate when direct flights can replace connecting flights and larger aircraft can be substituted, only when justified by demand.

Author

Airline Operations; Systems Analysis; Schedules; Air Transportation; Commercial Aircraft; Airports

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.

20070002123 Air Force Research Lab., Wright-Patterson AFB, OH USA

Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint)

Morton, Y T; Tsui, James B Y; Lin, David M; Liou, L L; Miller, Mikel M; Schamus, John; Zhou, Qihou; Aug 2003; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-7622

Report No.(s): AD-A458603; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458603>; Avail.: CASI: A03, Hardcopy

This paper presents an analysis of GPS CA code self-interference, its impact on the acquisition of weak GPS signal when coexisting with strong GPS signals, and means to mitigate the interference to allow successful acquisition of the weak GPS signals using software GPS receivers. Current software GPS receivers are capable of acquiring and tracking satellite signals with C/N0 as low as 24 dB, which is the sensitivity limit of a stand-alone GPS receiver. To achieve this level of sensitivity, there cannot be substantial interference from other satellites with strong signal levels. In practicality, however, the weak signals may coexist with much stronger signals from other satellites. This may happen when only a limited area of the sky is exposed to a receiver such as in the case of navigating in city canyon or under forest canopy. The presence of the strong signals may produce higher cross correlations between the strong signals and a weak signal, resulting in complete loss or false acquisition of weak signals which maybe necessary in helping to determine the user position. Software algorithm are developed that can successfully remove the strong satellite signals from the GPS receiver input. The resulting net input signal can then be used to acquire the weak signals. Experiments using both simulation and simulator data show that with the removal of strong satellite signal from the input, it is possible to acquire weak satellite near the sensitivity limit.

DTIC

Global Positioning System; Radio Signals

20070002127 Air Force Research Lab., Wright-Patterson AFB, OH USA

Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint)

Morton, Y T; Liou, Liyeh L; Lin, David M; Tsui, James B Y; Zhou, Qihou; Sep 2004; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-7622

Report No.(s): AD-A458609; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458609>; Avail.: CASI: A03, Hardcopy

This paper presents the performance analysis of two digital beam forming techniques used in conjunction with a software GPS receiver to mitigate interference to GPS signals in jamming environment. The first method is the constrained minimum power (MOP) method. The second method is the so-called self-coherence restoral (SCORE) method. Both experimental and simulation data are used in the study. The study was performed using experiment data collected in an anechoic chamber to obtain GPS and interference signals. A two by two GPS antenna array and a four channel radio frequency front end are used to collect simulated GPS data generated using hardware-based simulator in controlled jamming environment. Three types of interference signals are deployed in the experiments: FM chirp, binary phase shift key, and broadband. The interference power levels used were +20, +30, and +40 dB above GPS signal power. A software GPS receiver was used to perform acquisition of GPS signals to evaluate the performance of the beam forming algorithms. The preliminary result showed that MOP method can effectively mitigate all three types of interference at all power levels if a single jammer is present. Experiments using multiple broadband jammers were also analyzed and our results shown that the effectiveness of the MOP diminishes as the jammer power increases and ceases to function at the +40 dB level. The SCORE method does not exhibit consistent performance for the experimental data. This is consistent with our simulation results which show that for the SCORE algorithm to generate satisfactory results, sufficient number of antenna elements is necessary even if there is no interference source present. The number of antenna element is determined by the number of satellites available, as well as the number of interference source.

DTIC

Cancellation; Global Positioning System; Optimization

20070002128 Air Force Research Lab., Wright-Patterson AFB, OH USA

Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint)

Lin, David M; Tsui, James B Y; Sep 2004; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-7622

Report No.(s): AD-A458605; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458605>; Avail.: CASI: A02, Hardcopy

The WAAS uses geo-stationary satellites to receive data measured from many ground stations and transmits information to GPS users for position correction. Since the WAAS satellites are geo-stationary, the Doppler frequency caused by their motion is very small, typically, in the order of a few tens of Hz. Thus, the signal transmitted by the WAAS can be used to calibrate the sampling frequency in a GPS receiver. The WAAS signal frequency is at 1575.42 MHz. The sampling frequency of a C/A code GPS receiver is in the neighborhood of 5 MHz. The ratio of these two frequencies is about 300, thus, 10 Hz inaccuracy in the WAAS frequency will be translated to about 0.03 Hz (10/300). The accuracy of the sampling frequency measured through this approach should be less than 1 Hz. The clock in a low cost Motorola GPS receiver (Model M12 Oncore) is used in this study. The WAAS signal can be rather weak for users in certain areas. Two seconds of data collected by a software receiver using the Motorola front end are used in this study. The result using this approach has been compared with an high accurate RF (Radio Frequency) frequency counter (1 Hz accuracy). There is no difference in result. The detail of the algorithms and the clock calibration is reported.

DTIC

Augmentation; Calibrating; Clocks; Global Positioning System; Low Cost

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.

20070002944 NASA Dryden Flight Research Center, Edwards, CA, USA

A Brief Summary of the 2005 Pathfinder+ Aeroelastic/Turbulence Flight Tests

Donohue, Casey; 2005 Engineering Annual Report; December 2006, pp. 7-9; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002944>; Avail.: CASI:

A01, Hardcopy

In October 2004, rainfall flooded Rogers Dry Lake in Edwards, California and rendered all runways unusable, delaying flight testing of the Pathfinder+ solar-powered Unmanned Aerial Vehicle. In August 2005, the lakebed with associated runways and the AeroVironment/NASA team was ready to support flight tests. The first flight occurred on August 31, 2005, under clear skies and light winds. The aircraft did encounter some wind shear turbulence at approximately 1200 ft. The more intense turbulence, caused by thermal activity, was encountered at lower altitudes near the end of its two and a half hour flight. The second flight test occurred on September 14, 2005, under mostly clear skies and some light surface breezes. The second flight encountered a higher frequency of wind shear, or mechanical turbulence as compared to the first flight. During this flight, wind speeds were highest below the temperature inversion, which resulted in more mechanical turbulence at a much lower altitude than normal. The duration of the second flight was one hour and eight minutes. This second flight was the final flight of the flight test series and the final flight of the Pathfinder+ aircraft. The Pathfinder+ is scheduled for retirement and to be put on display at the Smithsonian Air and Space Museum in 2006

Author

Flight Tests; Pilotless Aircraft; Solar Powered Aircraft

20070002946 NASA Dryden Flight Research Center, Edwards, CA, USA

C-20A Precision Autopilot Development

Baumann, Ethan; Lee, James; Strovers, Brian; Lin, Victor; Redifer, Matt; 2005 Engineering Annual Report; December 2006, pp. 4-5; In English; See also 20070002942; Original contains color illustrations; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002946>; Avail.: CASI: A01, Hardcopy

A precision autopilot capability is being developed for the NASA C-20A (Gulfstream Aerospace, Savannah, Georgia) airplane as a part of the agency's Unmanned Aerial Vehicle Synthetic Aperture Radar (UAVSAR) program. The NASA UAVSAR program is developing a Synthetic Aperture Radar that fits within a pod that will be mounted underneath the forward

fuselage of the C-20A airplane. The precision autopilot interfaces with the C-20A through the Instrument Landing System (ILS). This approach makes use of the accuracy and safeguards inherent in the autopilot to fly the precision trajectory. This precision autopilot capability is currently in development and will enter flight testing during fall of 2006.

Author

Automatic Pilots; Pilotless Aircraft; Synthetic Aperture Radar; NASA Programs

20070002956 NASA Dryden Flight Research Center, Edwards, CA, USA

Hilbert-Huang Transform-Based Stability Spectral Analysis

Brenner, Marty; 2005 Engineering Annual Report; December 2006, pp. 30-32; In English; See also 20070002942; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002956>; Avail.: CASI: **A01**, Hardcopy

The Hilbert Huang transform (HHT) has been applied to analyze flight flutter data. The analysis shows the yielding of the test wing after the onset of flutter, but just before breaking off at the wingtip. Based on HHT, research using a new stability spectrum shows both positive (stable) and negative (unstable) damping. Flutter occurs in a different frequency range than that determined by modal analysis and identification. Both HHT- and the Teager Energy Operator-based nonlinearity indicator show that structural dynamics are nonlinear throughout the flight-test flutter maneuver.

Author

Flight Tests; Flutter; Hilbert Transformation; Spectrum Analysis; Stability Tests; Aeroelastic Research Wings

20070003037 Austral Engineering and Software, Inc., Athens, OH USA

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint)

Medina, Enrique A; Aldrin, John C; Knopp, Jeremy S; Allwine, Daniel A; Apr 2006; 11 pp.; In English
Contract(s)/Grant(s): F33615-03-C-5226; Proj-3005
Report No.(s): AD-A458865; AES-SHM-2006-001; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458865>;
Avail.: CASI: **A03**, Hardcopy

A variety of structural health monitoring (SHM) technologies has been proposed in the last few years for enhancing the ability to manage the life of aircraft structures. This work builds upon prior efforts comprising the development and demonstration of a software platform for integrating NDE design and product life management models. Based on probabilistic models of fatigue crack growth, detection, and repair, the demonstration cases show the ability of the method and software to assess the effects that changes in inspection parameters and scheduling can have on time-dependent reliability and maintenance cost objectives. Furthermore, the software facilitates design tradeoff assessment and optimization for goals such as cost, reliability, and system availability. This paper describes the development of probabilistic model components representing SHM systems, to be integrated into a hybrid life management approach where SHM and NDE are complementarily utilized. Example design cases include 1) analysis of near- and long-term costs and benefits of SHM applications, considering time-dependent sensor reliability, to provide insight into the potential opportunities and challenges of SHM applications and 2) assessment of maintenance programs that combine NDE and SHM systems. Two case study examples are presented to illustrate the value of these decision support tools and models.

DTIC

Aircraft; Crack Propagation; Health; Maintenance; Nondestructive Tests

20070003112 RAND Corp., Santa Monica, CA USA

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM

Keating, Edward G; Lored, Elvira N; Jan 2006; 54 pp.; In English
Contract(s)/Grant(s): FA7014-06-C-0001
Report No.(s): AD-A458978; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458978>; Avail.: CASI: **A04**, Hardcopy

The U.S. Air Force asked the RAND Corporation to study capability-based programming. As an initial case study, RAND evaluated the F-15 programmed depot maintenance (PDM) process as it occurs at the Warner Robins (WR) Air Logistics Center (ALC) at Robins Air Force Base in central Georgia. RAND studied the recent history of F-15 PDM at WR, including WR's recent implementation of 'lean' approaches. Depot maintenance funding influences capability. Aircraft enter programmed depot maintenance (PDM) on a regular schedule. The level of resources devoted to PDM influences both how much work is done in PDM (i.e., how much more reliable or capable aircraft are after leaving PDM) and the duration of PDM. Other things being equal, one expects a better-funded process to run more quickly (e.g., there are fewer queues within the

depot and more spare parts available). In this report, RAND focuses on the issue of PDM speed. When PDM is lengthy, more aircraft are tied up in PDM at any given point in time; fewer aircraft are available to operating commands. It would be desirable to expedite PDM: aircraft would spend a greater fraction of their lives in the possession of operating commands and available for usage, if required. In this report, they present a new methodology to estimate the value of accelerated PDM. For a commercial airline, calculating the value of expedited maintenance is (relatively) straightforward: a commercial airliner is expected to generate a certain amount of profit each day (or hour) it operates. Lost profit forms a benchmark for the value of accelerating commercial airliner PDM. Military aircraft lack such a profit metric. Yet, some valuation of military aircraft in operating command possession is necessary if the Air Force is to assess the desirability of investing resources in expediting PDM (or saving money by slowing PDM). The methodology presented in this report is intended to inform depot-level cost-benefit analysis.

DTIC

Cost Analysis; Cost Effectiveness; F-15 Aircraft; Fighter Aircraft; Jet Aircraft; Maintenance

20070003150 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Air Force Organizational Adoption of Remotely Piloted Vehicles

Falzarano, Thomas G; May 2004; 71 pp.; In English

Report No.(s): AD-A459039; AFIT/GMO/ENS/04-06; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459039>;

Avail.: CASI: **A04**, Hardcopy

The DOD's Unmanned Aerial Vehicle (UAV) Roadmap outlines the timeline for a potential Revolution in Military Affairs (RMA) where the Air Force and the other military services will shift from a reliance on manned aircraft in combat to remotely piloted vehicles (RPVs). Considering the far reaching influence that manned flight has had on the battlefield, shifting from manned to remotely piloted vehicles is expected to have significant ramifications within the Air Force, potentially influencing the organization's structure, skill requirements, and culture. This research attempts to determine the complex organizational issues associated with the adoption of RPVs by studying past RMAs and related transformations in the civilian sector. The end result is a framework for success that can be utilized to achieve success in this or any transformation effort.

DTIC

Aircraft; Remotely Piloted Vehicles

20070003173 Combustion Research and Flow Technology, Inc., Dublin, PA USA

Evaluation of Some Recent Jet Noise Reduction Concepts

Kannepalli, C; Kenzakowski, D C; Dash, Sanford M; Jan 2003; 18 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459076; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459076>; Avail.: CASI: **A03**,

Hardcopy

This paper discusses RANS based numerical simulations of a 1/10th scale over-expanded supersonic plume (resembling that of an F-18 aircraft) with chevrons used as passive noise reduction devices. Three variant designs of the chevrons mounted in specified azimuthal arrangements around the baseline nozzle exit are evaluated. A major effect of the chevrons is to amplify the Mach disc size and move it closer to the nozzle exit. For these over-expanded exhausts, the chevrons must extend sufficiently deep into the plume core stream to reduce jet noise levels. Results from our simulations are in nominal accord with the experimental observations (primarily noise measurements) as ascertained by examining the flow structure, and via using jet noise prediction codes. Evaluation of the thrust loss produced by these devices is found to be minimal except for the one chevron configuration that provided maximum noise reduction. Our studies indicate that noise reduction devices which work for laboratory model jets may have to be revised to have them work for the real engine due to complexities in the internal mixing which cannot be replicated at laboratory scale. We discuss issues related to these differences and with real aircraft effects such as plume/plume interactions and installation effects, and we present a complete aircraft/dual engine plume simulation using innovative multi-element unstructured gridding.

DTIC

Jet Aircraft Noise; Noise Reduction

20070003278 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA

The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems

von Spakovsky, Michael R; Periannan, Vijayanand; Markell, Kyle C; Brewer, Keith M; Apr 21, 2006; 73 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0189

Report No.(s): AD-A459272; VPI-208-11-110F-107-353-1; FRS-430029; No Copyright; ONLINE:
<http://hdl.handle.net/100.2/ADA459272>; Avail.: CASI: A04, Hardcopy

In M.S. thesis #1, advantages of applying exergy-based analysis and optimization methods to the synthesis/design and operation of aircraft systems is demonstrated using a supersonic aircraft fighter flown over an entire mission. A first set of optimizations involving four objectives (two energy-based and two exergy-based) are performed with only propulsion and environmental control subsystem degrees of freedom. Losses for the airframe subsystem are not incorporated into the two exergy-based objectives. The results show that, as expected, all four objectives globally produce the same optimum vehicle. A second set of optimizations is then performed with airframe degrees of freedom. However, this time one of the exergy-based objectives incorporates airframe losses directly into the objective. The results are that this latter objective produces a significantly better optimum vehicle. Thus, an exergy-based approach is not only able to pinpoint where the greatest inefficiencies in the system occur but seems to produce a superior optimum vehicle as well by accounting for irreversibility losses in subsystems only indirectly tied to fuel usage. No studies to date of which we are aware demonstrate the technology through an entire mission in which multiple flight conditions and constraints are encountered. Consequently, in M.S. theses #2 and #3, a formal Mach 6 through Mach 10 flight envelope is explored which includes cruise, acceleration/climb, deceleration/descend and turn mission segments. An exergy approach to the vehicle synthesis/design, in which trade-offs between dissimilar technologies are observed, is proposed and measured against traditional energy-based methods of assessing highly integrated systems. The mission-level analysis provides much insight into the dynamics of mission-level hypersonic flight and demonstrates the usefulness of an exergy destruction minimization measure for highly integrated synthesis/design.

DTIC
Aerospace Systems; Aircraft Design; Decomposition; Optimization

20070003336 Air Force Research Lab., Wright-Patterson AFB, OH USA

Ultra High Work, High Efficiency Turbines For UAVs

Sondergaard, Rolf; Jun 2006; 29 pp.; In English

Contract(s)/Grant(s): Proj-2307

Report No.(s): AD-A459406; AFRL-PR-WP-TR-2006-2228; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459406>; Avail.: CASI: A03, Hardcopy

The opportunity for the reattachment and control of separated flows occurs in inlets, compressors, transition ducts and turbines. Passive and active control of separated flows has been demonstrated successfully by a number of techniques which employ the introduction of longitudinal or streamwise vortices. The role of these vortices is initially to reenergize the wall boundary layer flow by entraining and redistributing momentum from the primary flow to the wall layer and enhance early transition. A chain of non-linear interactions of these unsteady vortices with large scale unsteady separation vortices and the shed shear layer results in significant alteration of the circulation. The resulting increased circulation allows higher blade loadings, reduced part count, and improved performance at low Reynolds numbers.

DTIC

Drone Vehicles; Turbines

06

AVIONICS AND AIRCRAFT INSTRUMENTATION

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

20070002163 NASA Marshall Space Flight Center, Huntsville, AL, USA

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview

Monell, Donald W.; Flynn, Kevin C.; Maroney, Johnny; [2006]; 1 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Copyright; Avail.: Other Sources; Abstract Only

On January 14, 2004, the President of the USA announced a new plan to explore space and extend a human presence across our solar system. The National Aeronautics and Space Administration (NASA) established the Exploration Systems Mission Directorate (ESMD) to develop and field a Constellation Architecture that will bring the Space Exploration vision to fruition. The Constellation Architecture includes a human-rated Crew Launch Vehicle (CLV) segment, managed by the Marshall Space Flight Center (MSFC), comprised of the First Stage (FS), Upper Stage (US), and Upper Stage Engine (USE) elements. The CLV's purpose is to provide safe and reliable crew and cargo transportation into Low Earth Orbit (LEO), as

well as insertion into trans-lunar trajectories. The architecture's Spacecraft segment includes, among other elements, the Crew Exploration Vehicle (CEV), managed by the Johnson Space Flight Center (JSC), which is launched atop the CLV. MSFC is also responsible for CLV and CEV stack integration. This paper provides an overview of the Avionics and Software integration approach (which includes the Integrated System Health Management (ISHM) functions), both within the CLV, and across the CEV interface; it addresses the requirements to be met, logistics of meeting those requirements, and the roles of the various groups. The Avionics Integration and Vehicle Systems Test (ANST) Office was established at the MSFC with system engineering responsibilities for defining and developing the integrated CLV Avionics and Software system. The AIVST Office has defined two Groups, the Avionics and Software Integration Group (AVSIG), and the Integrated System Simulation and Test Integration Group (ISSTIG), and four Panels which will direct trade studies and analyses to ensure the CLV avionics and software meet CLV system and CEV interface requirements. The four panels are: 1) Avionics Integration Panel (AIP), 2) Software Integration Panel, 3) EEE Panel, and 4) Systems Simulation and Test Panel. Membership on the groups and panels includes the MSFC representatives from the requisite engineering disciplines, the First Stage, the Upper Stage, the Upper Stage Engine projects, and key personnel from other NASA centers. The four panels will take the results of trade studies and analyses and develop documentation in support of Design Analysis Cycle Reviews and ultimately the System Requirements Review.

Author

Avionics; Software Engineering; Systems Integration; Crew Exploration Vehicle; NASA Programs; General Overviews

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.

20070002566 Texas A&M Univ., College Station, TX USA, New Jersey Inst. of Tech., Newark, NJ, USA

Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency

Rajagopal, K. R.; Rao, I. J.; May 2006; 78 pp.; In English

Report No.(s): DE2006-887494; No Copyright; Avail.: National Technical Information Service (NTIS)

The demand for increased efficiency of gas turbines used in power generation and aircraft applications has fueled research into advanced materials for gas turbine blades that can withstand higher temperatures in that they have excellent resistance to creep. The term Superalloys describes a group of alloys developed for applications that require high performance at elevated temperatures. Superalloys have a load bearing capacity up to 0.9 times their melting temperature. The objective of the investigation was to develop a thermodynamic model that can be used to describe the response of single crystal superalloys that takes into account the microstructure of the alloy within the context of a continuum model. Having developed the model, its efficacy was to be tested by corroborating the predictions of the model with available experimental data. Such a model was developed and it is implemented in the finite element software ABAQUS/STANDARD through a user subroutine (UMAT) so that the model can be used in realistic geometries that correspond to turbine blades.

NTIS

Gas Turbines; Single Crystals; Turbine Blades

20070002705 NASA Glenn Research Center, Cleveland, OH, USA

Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development

Wrbanek, John D.; Fralick, Gustave C.; Hunter, Gary W.; December 2006; 19 pp.; In English

Contract(s)/Grant(s): SAA3-307-A30; WBS 726.01.03

Report No.(s): NASA/TM-2006-214466; E-15758; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002705>;

Avail.: CASI: A03, Hardcopy

The need to consider ceramic sensing elements is brought about by the temperature limits of metal thin film sensors in propulsion system applications. In order to have a more passive method of negating changes of resistance due to temperature, an effort is underway at NASA Glenn to develop high temperature thin film ceramic static strain gauges for application in turbine engines, specifically in the fan and compressor modules on blades. Other applications can be on aircraft hot section structures and on thermal protection systems. The near-term interim goal of the research effort was to identify candidate thin

film ceramic sensor materials to test for viability and provide a list of possible thin film ceramic sensor materials and corresponding properties to test for viability. This goal was achieved by a thorough literature search for ceramics that have the potential for application as high temperature thin film strain gauges, reviewing potential candidate materials for chemical and physical compatibility with our microfabrication procedures and substrates.

Author

Thin Films; Strain Gages; Ceramics; Metal Films; Thermal Protection; High Temperature

20070002752 Honeywell International, Inc., Morristown, NJ, USA

Dual Mode Power Unit Having a Combustor Bypass System

Critchley, I. L.; Kingery, B. J.; Frost, C.; Walhood, D. G.; Sumegi, R. B.; 10 Nov 03; 12 pp.; In English

Contract(s)/Grant(s): N00019-02-C-3002

Patent Info.: Filed 10 Nov 03; US-Patent-Appl-SN-10-705 2245

Report No.(s): PB2007-100876; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A gas turbine engine integrates the functions of an auxiliary power unit (APU) with one or more of an ECS, and that is capable of operating in both an unfired mode and a fired mode. The gas turbine engine includes a combustor system that is configured to allow the gas turbine to quickly transition from the unfired mode to the fired mode, by bypassing a portion of the air flowing to the combustor system around the combustor.

NTIS

Auxiliary Power Sources; Combustion Chambers; Gas Turbine Engines

20070002904 NASA Glenn Research Center, Cleveland, OH, USA

Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics

Kobayashi, Takahisa; Simon, Donald L.; December 2006; 26 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): WBS 846.02.07.03.03.01

Report No.(s): NASA/TM-2006-214491; E-15783; ARL-TR-4001; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002904>; Avail.: CASI: [A03](#), Hardcopy

In this paper, a uniquely structured Kalman filter is developed for its application to in-flight diagnostics of aircraft gas turbine engines. The Kalman filter is a hybrid of a nonlinear on-board engine model (OBEM) and piecewise linear models. The utilization of the nonlinear OBEM allows the reference health baseline of the in-flight diagnostic system to be updated to the degraded health condition of the engines through a relatively simple process. Through this health baseline update, the effectiveness of the in-flight diagnostic algorithm can be maintained as the health of the engine degrades over time. Another significant aspect of the hybrid Kalman filter methodology is its capability to take advantage of conventional linear and nonlinear Kalman filter approaches. Based on the hybrid Kalman filter, an in-flight fault detection system is developed, and its diagnostic capability is evaluated in a simulation environment. Through the evaluation, the suitability of the hybrid Kalman filter technique for aircraft engine in-flight diagnostics is demonstrated.

Author

Kalman Filters; Aircraft Engines; Gas Turbine Engines; Mathematical Models

20070002980 NASA Glenn Research Center, Cleveland, OH, USA

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control

DeCastro, Jonathan; Melcher, Kevin; Noebe, Ronald; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 223-237; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI:

[A03](#), Hardcopy

Results of a numerical analysis evaluating the feasibility of high-temperature shape memory alloys (HTSMA) for active clearance control actuation in the high-pressure turbine section of a modern turbofan engine has been conducted. The prototype actuator concept considered here consists of parallel HTSMA wires attached to the shroud that is located on the exterior of the turbine case. A transient model of an HTSMA actuator was used to evaluate active clearance control at various operating points in a test bed aircraft engine simulation. For the engine under consideration, each actuator must be designed to counteract loads from 380 to 2000 lbf and displace at least 0.033 in. Design results show that an actuator comprised of 10 wires 2 in. in length is adequate for control at critical engine operating points and still exhibit acceptable failsafe operability and cycle life. A proportional-integral-derivative (PID) controller with integrator windup protection was implemented to control clearance amidst engine transients during a normal mission. Simulation results show that the control system exhibits minimal variability in clearance control performance across the operating envelope. The final actuator design is sufficiently

small to fit within the limited space outside the high-pressure turbine case and is shown to consume only small amounts of bleed air to adequately regulate temperature.

Derived from text

Shape Memory Alloys; Turbofan Engines; Heat Resistant Alloys; Numerical Analysis; Life (Durability); Loads (Forces); High Pressure; Active Control

20070002998 General Electric Aircraft Engines, Cincinnati, OH, USA

Advanced Thermal HPT Clearance Control

Wojciech Voytek, Sak; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 167-178; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

OBJECTIVE: Develop a fast acting HPT Active Clearance Control System to improve engine efficiency and reduce emissions CHALLENGE: Reduction of HPT blade clearance throughout engine operation System complexity, reliability and cost must remain comparable or surpass today's engines Reduced clearance may increase possibility of rubs

Derived from text

Active Control; Aircraft Engines; Exhaust Emission; Reliability; Temperature Control; Combustion Products

20070002999 NASA Glenn Research Center, Cleveland, OH, USA

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update

Taylor, Shawn; Steinetz, Bruce; Oswald, Jay; DeCastro, Jonathan; Melcher, Kevin; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 179-197; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The objective is to develop and demonstrate a fast-acting active clearance control system to improve turbine engine performance, reduce emissions, and increase service life. System studies have shown the benefits of reducing blade tip clearances in modern turbine engines. Minimizing blade tip clearances throughout the engine will contribute materially to meeting NASA's Ultra-Efficient Engine Technology (UEET) turbine engine project goals. NASA GRC is examining two candidate approaches including rub-avoidance and regeneration which are explained in subsequent slides.

Derived from text

Turbine Engines; Active Control; Exhaust Emission; Service Life; Blade Tips; Exhaust Gases; Turbine Blades

20070003343 Air Force Research Lab., Wright-Patterson AFB, OH USA

Turbine Aerothermal Research

Sondergaard, Rolf; Ou, Suichuan; Rivir, Richard B; Apr 2006; 25 pp.; In English

Contract(s)/Grant(s): FA8650-05-M-3548; Proj-2307

Report No.(s): AD-A459414; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459414>; Avail.: CASI: [A03](#), Hardcopy

This is a summary of the work performed under Job Order Number 2307S315. This was an in-house task funded under AFOSR ILIR grants 92PR07COR and 02PR02COR. This task and its predecessors have been in continual operation since 1985 and have covered a broad range of topics relating to the aerodynamics and thermodynamics of the turbine module of gas turbine engines. The work initially focused on the effects of very high turbulence freestream flows on the development of the boundary layers of the turbine component, with particular attention to the effect on heat transfer. It has also pursued techniques for the control of airfoil boundary layers and cooling flows and the development of advanced techniques for the measurement and study of these flows.

DTIC

Gas Turbines; Heat Transfer; Turbines

20070003489 NASA Glenn Research Center, Cleveland, OH, USA

Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles

Brown, Clifford A.; Bridges, James; December 2006; 21 pp.; In English; 12th Aeroacoustics Conference, 8-10 May 2006, Cambridge, MA, USA

Contract(s)/Grant(s): WBS 581.02.08.03.03.02

Report No.(s): NASA/TM-2006-214364; E-15640; AIAA Paper 2006-2654; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070003489>; Avail.: CASI: [A03](#), Hardcopy

The link between azimuthal modes in jet turbulence and in the acoustic sound field has been examined in cold, round jets.

Chevron nozzles, however, impart an azimuthal structure on the jet with a shape dependent on the number, length and penetration angle of the chevrons. Two particular chevron nozzles, with 3 and 4 primary chevrons respectively, and a round baseline nozzle are compared at both cold and hot jet conditions to determine how chevrons impact the modal structure of the flow and how that change relates to the sound field. The results show that, although the chevrons have a large impact on the azimuthal shape of the mean axial velocity, the impact of chevrons on the azimuthal structure of the fluctuating axial velocity is small at the cold jet condition and smaller still at the hot jet condition. This is supported by results in the azimuthal structure of the sound field, which also shows little difference in between the two chevron nozzles and the baseline nozzle in the distribution of energy across the azimuthal modes measured.

Author

Jet Aircraft Noise; Acoustic Properties; Acoustics

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.

20070002945 NASA Dryden Flight Research Center, Edwards, CA, USA

Multi-Input Multi-Output Flight Data Analysis with HHT

Brenner, Marty; 2005 Engineering Annual Report; December 2006, pp. 33-35; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002945>; Avail.: CASI: [A01](#), Hardcopy

This research investigates the utility of the Hilbert Huang Transform (HHT) for the analysis of aeroelastic multi-input multi-output (MIMO) flight data. The recently-developed Hilbert Huang algorithm addresses the limitations of the classical Hilbert transform through a process known as empirical mode decomposition. Using this approach, the data is filtered into a series of intrinsic mode functions, each of which admits a well-behaved Hilbert transform. In this manner, the Hilbert Huang algorithm affords time-frequency analysis of a large class of signals. The purpose of this research is to demonstrate the potential applications of the Hilbert Huang algorithm for the analysis of multi-loop aeroelastic systems. Applications for correlations between system input and output, and among output sensors, characterize the time-varying amplitude and frequency correlations present in the various components of multiple data channels. Online stability analyses and modal identification are new applications for the algorithm, particularly in the area of aeroelastic and aeroservoelastic systems analysis.

Author

Aeroelasticity; Aeroservoelasticity; Hilbert Transformation; MIMO (Control Systems); Data Processing

20070002951 NASA Dryden Flight Research Center, Edwards, CA, USA

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach

Kukreja, Sunil; 2005 Engineering Annual Report; December 2006, pp. 25-26; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002951>; Avail.: CASI: [A01](#), Hardcopy

Structure detection is a procedure for selecting a subset of candidate terms, from a full model description, that best describes the observed output. This is a necessary procedure to compute an efficient system description that may afford greater insight into the functionality of the system or provide a simpler controller design. Structure computation as a tool for 'black-box' modeling is not well known to the flight-test community, but may be of critical importance in the development of robust, parsimonious models. Moreover, this approach may lead to efficient strategies for rapid envelope expansion that may save significant development time and reduce costs. Structure detection methods applicable to NARMAX (Nonlinear AutoRegressive Moving Average eXogenous) modeling are applied to aeroelastic dynamics, whose properties are demonstrated via continuous-time simulations. Simulation results from a nonlinear dynamic model of aircraft structural free-play demonstrate that methods developed for NARMAX structure computation provide a high degree of accuracy for selection of the exact model structure from an over-parameterized model description. Applicability of these methods to the F/A-18 Active Aeroelastic Wing using flight-test data is shown by identifying a parsimonious system description with a high percent fit for cross-validated data.

Author

Aeroelastic Research Wings; Nonlinearity; Detection; Aircraft Structures; Aerospace Systems; Systems Analysis; Dynamic Models

20070002957 NASA Dryden Flight Research Center, Edwards, CA, USA

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm

Brenner, Marty; 2005 Engineering Annual Report; December 2006, pp. 36-38; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002957>; Avail.: CASI: A01, Hardcopy

This research investigates the utility of the Hilbert Huang transform (HHT) for the analysis of aeroelastic flight data. It is well known that the classical Hilbert transform can be used for time frequency analysis of functions or signals. Unfortunately, the Hilbert transform can only be effectively applied to an extremely small class of signals, namely those characterized by a single frequency component at any instant in time. The recently-developed Hilbert Huang algorithm addresses the limitations of the classical Hilbert transform through a process known as empirical mode decomposition (EMD). Using this approach, the data is filtered into a series of intrinsic mode functions (IMFs), each of which admits a well-behaved Hilbert transform. In this manner, the Hilbert Huang algorithm affords time-frequency analysis of a large class of signals. The algorithm has been applied in the analysis of scientific data, structural system identification, mechanical system fault detection, and even image processing. This research demonstrates the applications of the Hilbert Huang algorithm for the analysis of aeroelastic systems, with improvements such as localized on-line processing. Applications for correlations between system input and output, and among output sensors, are used to characterize the time-varying amplitude and frequency correlations present in the various components of multiple data channels. Online stability analyses and modal identification are other objectives. Example demonstrations include using aeroelastic test data from the F-18 Active Aeroelastic Wing (AAW) airplane, an Aerostructures Test Wing, and pitch plume simulation.

Author

Aeroelastic Research Wings; Algorithms; Data Processing; Hilbert Transformation; Flight Tests

20070002958 NASA Dryden Flight Research Center, Edwards, CA, USA

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification

Kukreja, Sunil; 2005 Engineering Annual Report; December 2006, pp. 39-40; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002958>; Avail.: CASI: A01, Hardcopy

Identification of parametric nonlinear models involves estimating unknown parameters and detecting the underlying structure. Structure computation is concerned with selecting a subset of parameters to give a parsimonious description of the system that may afford greater insight into the functionality of the system or a simpler controller design. In this research, a least absolute shrinkage and selection operator (LASSO) technique is investigated for computing efficient model descriptions of nonlinear systems. The LASSO minimizes the residual sum of squares by the addition of a 1-norm penalty term on the parameter vector of the traditional 2-norm minimization problem. Use of the LASSO for structure detection is a natural extension of this constrained minimization approach to pseudolinear regression problems, which produces some model parameters that are exactly zero and, therefore, yields a parsimonious system description. The performance of this LASSO structure detection method was evaluated by using it to estimate the structure of a nonlinear polynomial model. The applicability of the method to more complex systems was shown by identifying a parsimonious system description of the F/A-18 (McDonnell Douglas Corporation, St. Louis Missouri and Northrop Corporation, Newbury Park, California) Active Aeroelastic Wing (AAW) from flight test data.

Author

Nonlinear Systems; Shrinkage; System Identification; Parameterization; Operators (Mathematics); Aerospace Systems; Aeroelasticity

20070003271 Air Force Research Lab., Wright-Patterson AFB, OH USA

Flight Display Integration

French, Guy A; Hopper, Darrel G; Reising, John M; Snow, Michael P; Oct 2006; 64 pp.; In English

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

Report No.(s): AD-A459262; AFRL-HE-WP-TR-2006-0154; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459262>; Avail.: CASI: A04, Hardcopy

This report begins with a discussion of the analysis of the human and display factors relevant to synthetic vision in a military cockpit environment. It then describes the results of studies examining the impact of synthetic vision displays on pilot situation awareness and workload. Concluding remarks on additional factors affecting the use of synthetic vision and a future concept for its implementation are described.

DTIC

Air Navigation; Cockpits; Display Devices; Enhanced Vision; Flight Instruments; Navigation Aids; Situational Awareness

20070003486 NASA Ames Research Center, Moffett Field, CA, USA

Guidance of Nonlinear Systems

Meyer, George; June 13, 1997; 1 pp.; In English; Optimization and System Theory Seminar Series, 10 - 18 Jun. 1997, Stockholm, Sweden

Contract(s)/Grant(s): RTOP #548-40-12; No Copyright; Avail.: Other Sources; Abstract Only

The paper describes a method for guiding a dynamic system through a given set of points. The paradigm is a fully automatic aircraft subject to air traffic control (ATC). The ATC provides a sequence of way points through which the aircraft trajectory must pass. The way points typically specify time, position, and velocity. The guidance problem is to synthesize a system state trajectory which satisfies both the ATC and aircraft constraints. Complications arise because the controlled process is multi-dimensional, multi-axis, nonlinear, highly coupled, and the state space is not flat. In addition, there is a multitude of possible operating modes, which may number in the hundreds. Each such mode defines a distinct state space model of the process by specifying the state space coordinatization, the partition of the controls into active controls and configuration controls, and the output map. Furthermore, mode transitions must be smooth. The guidance algorithm is based on the inversion of the pure feedback approximations, which is followed by iterative corrections for the effects of zero dynamics. The paper describes the structure and modules of the algorithm, and the performance is illustrated by several example aircraft maneuvers.

Author

Nonlinear Systems; Algorithms; Dynamical Systems; Air Traffic Control; Guidance (Motion)

09

RESEARCH AND SUPPORT FACILITIES (AIR)

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

20070003493 NASA Langley Research Center, Hampton, VA, USA

Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW

DeLoach, Richard; Philipsen, Iwan; [2007]; 25 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 076.07.80

Report No.(s): AIAA Paper 2007-0144; Copyright; Avail.: CASI: [A03](#), Hardcopy

This paper reports a comparison of two experiment design methods applied in the calibration of a strain-gage balance. One features a 734-point test matrix in which loads are varied systematically according to a method commonly applied in aerospace research and known in the literature of experiment design as One Factor At a Time (OFAT) testing. Two variations of an alternative experiment design were also executed on the same balance, each with different features of an MDOE experiment design. The Modern Design of Experiments (MDOE) is an integrated process of experiment design, execution, and analysis applied at NASA's Langley Research Center to achieve significant reductions in cycle time, direct operating cost, and experimental uncertainty in aerospace research generally and in balance calibration experiments specifically. Personnel in the Instrumentation and Controls Department of the German Dutch Wind Tunnels (DNW) have applied MDOE methods to evaluate them in the calibration of a balance using an automated calibration machine. The data have been sent to Langley Research Center for analysis and comparison. This paper reports key findings from this analysis. The chief result is that a 100-point calibration exploiting MDOE principles delivered quality comparable to a 700+ point OFAT calibration with significantly reduced cycle time and attendant savings in direct and indirect costs. While the DNW test matrices implemented key MDOE principles and produced excellent results, additional MDOE concepts implemented in balance calibrations at Langley Research Center are also identified and described.

Author

Calibrating; Design Analysis; Experiment Design; Regression Analysis; Strain Gage Balances

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*.

20070002790 NASA Marshall Space Flight Center, Huntsville, AL, USA

Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts

Mooney, James t.; Gregory, Don; Herren, Ken; Howsman, Tom; [2007]; 3 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

There is a continuous demand for larger, lighter, and higher quality telescopes from both the astronomical and global surveillance communities one looking up and the other down. Enabling technologies must be developed and implemented that will allow this goal to be financially and technically feasible. The optical systems needed for high spatial resolution surveillance and astronomical applications require large optical apertures with diameters up to 150 meter in diameter. With traditional optical manufacturing technologies, large optical aperture means high mass and long fabrication lead times with associated high costs. Completely new approaches to optical fabrication must be developed to enable the fabrication of such optical systems. The cost and lead time associated with the fabrication of lightweight, high quality optical systems limits the feasible size of the optics. A primary factor in the launch cost of space optical systems is volume and mass. To minimize the mass of the high quality optics, optical fabricators implement materials with high specific stiffness and use honeycomb, or other structural minimization patterns, to support the optical surface; however, the structure must still be designed to survive launch loads. This significantly adds to the fabrication difficulty and dramatically increases launch costs. One approach to minimizing launch volume and negating the need for the design to survive launch loads is to send the manufacturing facility and raw materials into space and perform the fabrication in-situ. We are currently performing feasibility studies of initial concepts for inspace manufacturing of optical systems. By utilizing the micro-gravity and vacuum environment of space while eliminating the constraints defined by high launch forces and limited volume of the launch vehicle, the development of large, high quality glass membrane mirrors may be feasible. Several concepts were investigated to address the manufacturing of both optical surfaces and telescope structure. We will describe one of the primary approaches to utilize the space environment for optical manufacturing and describe initial results.

Derived from text

Fabrication; Optical Materials; Space Manufacturing; Low Gravity Manufacturing; Space Processing; Optical Equipment; Manufacturing; Spaceborne Telescopes

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)*.

20070002900 NASA Stennis Space Center, Stennis Space Center, MS, USA

A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test

Messer, Bradley; [2007]; 10 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color illustrations

Report No.(s): SSTI-8080-0015; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002900>; Avail.: CASI: [A02](#), Hardcopy

Propulsion ground test facilities face the daily challenge of scheduling multiple customers into limited facility space and successfully completing their propulsion test projects. Over the last decade NASA's propulsion test facilities have performed hundreds of tests, collected thousands of seconds of test data, and exceeded the capabilities of numerous test facility and test article components. A logistic regression mathematical modeling technique has been developed to predict the probability of successfully completing a rocket propulsion test. A logistic regression model is a mathematical modeling approach that can be used to describe the relationship of several independent predictor variables $X_{(sub\ 1)}$, $X_{(sub\ 2)}$, ..., $X_{(sub\ k)}$ to a binary or dichotomous dependent variable Y , where Y can only be one of two possible outcomes, in this case Success or Failure of accomplishing a full duration test. The use of logistic regression modeling is not new; however, modeling propulsion ground test facilities using logistic regression is both a new and unique application of the statistical technique. Results from this type

of model provide project managers with insight and confidence into the effectiveness of rocket propulsion ground testing.
Author
Ground Tests; Rocket Test Facilities; Probability Theory; Rocket Engine Design; Mathematical Models

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*.

20070002621 NASA Marshall Space Flight Center, Huntsville, AL, USA

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics

Huebner, Lawrence D.; Haynes, Davy A.; Taylor, Terry L.; Hall, Robert M.; Pamadi, Bandu N.; Seaford, C. Mark; [2006]; 12 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations

Report No.(s): IAC-06-D2.7.03; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002621>; Avail.: CASI: [A03](#), Hardcopy

Following the completion of NASA's Exploration Systems Architecture Study in August 2004 for the NASA Exploration Systems Mission Directorate (ESMD), the Exploration Launch Office at the NASA Marshall Space Flight Center was assigned project management responsibilities for the design and development of the first vehicle in the architecture, the Ares I Crew Launch Vehicle (CLV), which will be used to launch astronauts to low earth orbit and rendezvous with either the International Space Station or the ESMD's earth departure stage for lunar or other future missions beyond low Earth orbit. The primary elements of the Ares I CLV project are the first stage, the upper stage, the upper stage engine, and vehicle integration. Within vehicle integration is an effort in integrated design and analysis which is comprised of a number of technical disciplines needed to support vehicle design and development. One of the important disciplines throughout the life of the project is aerodynamics. This paper will present the status, plans, and initial results of Ares I CLV aerodynamics as the project was preparing for the Ares I CLV Systems Requirements Review. Following a discussion of the specific interactions with other technical panels and a status of the current activities, the plans for aerodynamic support of the Ares I CLV until the initial crewed flights will be presented.

Author

Ares 1 Launch Vehicle; Ares 5 Cargo Launch Vehicle; Design Analysis; Low Earth Orbits; Launching

20070002622 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process

Cook, Jerry R.; [2006]; 13 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002622>; Avail.: CASI: [A03](#), Hardcopy

The Upper Stage Element of NASA's Ares I Crew Launch Vehicle (CLV) is a 'clean-sheet' approach that is being designed and developed in-house, with Element management at MSFC. The USE concept is a self-supporting cylindrical structure, approximately 115 long and 216' in diameter. While the Reusable Solid Rocket Booster (RSRB) design has changed since the CLV inception, the Upper Stage Element design has remained essentially a clean-sheet approach. Although a clean-sheet upper stage design inherently carries more risk than a modified design, it does offer many advantages: a design for increased reliability; built-in extensibility to allow for commonality/growth without major redesign; and incorporation of state-of-the-art materials, hardware, and design, fabrication, and test techniques and processes to facilitate a potentially better, more reliable system.

Author

Ares 1 Launch Vehicle; Launch Vehicle Configurations; Solid Propellant Rocket Engines; Space Shuttle Boosters

20070002623 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office

Kidd, Luanne; Morris, Kenneth B.; Self, Tim; [2006]; 14 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The U.S. Vision for Space Exploration directs NASA to retire the Space Shuttle in 2010 and replace it with safe, reliable,

and cost-effective space transportation systems for crew and cargo travel to the Moon, Mars, and beyond. Such emerging space transportation initiatives face massive organizational challenges, including building and nurturing an experienced, dedicated team with the right skills for the required tasks; allocating and tracking the fiscal capital invested in achieving technical progress against an integrated master schedule; and turning generated data into useful knowledge that equips the team to design and develop superior products for customers and stakeholders. This paper discusses how NASA's Exploration Launch Projects Office, which is responsible for delivering these new launch vehicles, integrates these resources to create an engineering business environment that promotes mission success.

Author

Launch Vehicles; Space Exploration; NASA Programs; Budgets

20070002791 NASA Marshall Space Flight Center, Huntsville, AL, USA

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design

Dumbacher, Daniel; [2006]; 15 pp.; In English; AIAA Space 2006, 19-21 Sep. 2006, San Jose, CA, USA; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002791>; Avail.: CASI: A03, Hardcopy

The U.S. Vision for Space Exploration guides the National Aeronautics and Space Administration's (NASA's) challenging missions that expand humanity's boundaries and open new routes to the space frontier. With the Agency's commitment to complete the International Space Station (ISS) and to retire the venerable Space Shuttle by 2010, the NASA Administrator commissioned the Exploration Systems Architecture Study (ESAS) in mid 2005 to analyze options for safe, simple, cost-efficient launch solutions that could deliver human-rated space transportation capabilities in a timely manner within fixed budget guidelines. The Exploration Launch Projects Office, chartered in October 2005, has been conducting systems engineering studies and business planning over the past few months to successively refine the design configurations and better align vehicle concepts with customer and stakeholder requirements, such as significantly reduced life-cycle costs. As the Agency begins the process of replacing the Shuttle with a new generation of spacecraft destined for missions beyond low-Earth orbit to the Moon and Mars, NASA is designing the follow-on crew and cargo launch systems for maximum operational efficiencies. To sustain the long-term exploration of space, it is imperative to reduce the \$4.5 billion NASA typically spends on space transportation each year. This paper gives top-level information about how the follow-on Ares I Crew Launch Vehicle (CLV) is being designed for improved safety and reliability, coupled with reduced operations costs.

Author

Ares I Launch Vehicle; Life Cycle Costs; NASA Programs; Rocket Launching; Spacecraft Launching; Systems Engineering; Design Optimization; Management Planning

20070002794 NASA Marshall Space Flight Center, Huntsville, AL, USA

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle

Sumrall, John P.; [2006]; 16 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002794>; Avail.: CASI: A03, Hardcopy

The National Aeronautics and Space Administration (NASA) is developing new launch systems in preparation for the retirement of the Space Shuttle by 2010, as directed in the USA (U.S.) Vision for Space Exploration. The Ares I Crew Launch Vehicle (CLV) and the Ares V heavy-lift Cargo Launch Vehicle (CaLV) systems will build upon proven, reliable hardware derived from the Apollo Saturn (1961 to 1975) and Space Shuttle (1972 to 2010) programs to deliver safe, reliable, affordable space transportation solutions. This approach leverages existing aerospace talent and a unique infrastructure, as well as the vast amount of legacy knowledge gained from almost a half-century of hard-won experience in the space enterprise. Beginning early next decade, the Ares I will launch the new Crew Exploration Vehicle (CEV) to the International Space Station (ISS) or to low-Earth orbit for trips to the Moon and, ultimately, Mars. Late next decade, the Ares V's Earth Departure Stage will carry larger payloads such as the lunar lander into orbit, and the Crew Exploration Vehicle will dock with it for missions to the Moon, where astronauts will explore new territories and conduct science and technology experiments. Both the Ares I and Ares V systems are being designed to support longer future trips to Mars. The Exploration Launch Projects Office, located at NASA's Marshall Space Flight Center, is designing, developing, testing, and evaluating both launch vehicle systems in partnership with other NASA Centers, Government agencies, and industry contractors. This paper provides top-level information regarding the genesis and evolution of the baseline configuration for the Ares V heavy-lift system. It also touches on risk-based management strategies, such as building on powerful hardware and promoting common features between the Ares I and Ares V systems to reduce technical, schedule, and cost risks, as well as development and operations costs. Finally, it gives a summary of several notable accomplishments over the past year, since the Exploration Launch Projects effort

officially kicked off in October 2005, and looks ahead at work planned for 2007 and beyond.

Author

Ares 1 Launch Vehicle; Ares 5 Cargo Launch Vehicle; Heavy Lift Launch Vehicles; Space Transportation; Spacecraft Launching

20070002798 NASA Marshall Space Flight Center, Huntsville, AL, USA

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle

Dumbacher, Daniel L.; [2006]; 22 pp.; In English; AIAA Space 2006, 19-21 Sep. 2006, San Jose, CA, USA; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002798>; Avail.: CASI: **C01**, CD-ROM: **A03**, Hardcopy

The U.S. vision for space exploration is to: a) Implement a sustained and affordable human and robotic program to explore the solar system and beyond b) Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for the human exploration of Mars and other destinations c) Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration, and d) Promote international and commercial participation in exploration.

Derived from text

Ares 5 Cargo Launch Vehicle; Space Exploration; Launch Vehicles; Robotics

20070002803 NASA Marshall Space Flight Center, Huntsville, AL, USA

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions

Snoddy, Jim; [2006]; 16 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002803>; Avail.: CASI: **A03**, Hardcopy

The USA (U.S.) Vision for Space Exploration directs NASA to develop two new launch vehicles for sending humans to the Moon, Mars, and beyond. In January 2006, NASA streamlined its hardware development approach for replacing the Space Shuttle after it is retired in 2010. Benefits of this approach include reduced programmatic and technical risks and the potential to return to the Moon by 2020, by developing the Ares I Crew Launch Vehicle (CLV) propulsion elements now, with full extensibility to future Ares V Cargo Launch Vehicle (CaLV) lunar systems. This decision was reached after the Exploration Launch Projects Office performed a variety of risk analyses, commonality assessments, and trade studies. The Constellation Program selected the Pratt & Whitney Rocketdyne J-2X engine to power the Ares I Upper Stage Element and the Ares V Earth Departure Stage. This paper narrates the evolution of that decision; describes the performance capabilities expected of the J-2X design, including potential commonality challenges and opportunities between the Ares I and Ares V launch vehicles; and provides a current status of J-2X design, development, and hardware testing activities. This paper also explains how the J-2X engine effort mitigates risk by building on the Apollo Program and other lessons lived to deliver a human-rated engine that is on an aggressive development schedule, with its first demonstration flight in 2012.

Author

Ares 1 Launch Vehicle; Ares 5 Cargo Launch Vehicle; Launch Vehicles; Propulsion; Ares 1 Upper Stage

20070002810 NASA Marshall Space Flight Center, Huntsville, AL, USA

Systems Integration Processes for NASA Ares I Crew Launch Vehicle

Taylor, James L.; Reuter, James L.; Sexton, Jeffrey D.; [2006]; 12 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002810>; Avail.: CASI: **A03**, Hardcopy

NASA's Exploration Initiative will require development of many new elements to constitute a robust system of systems. New launch vehicles are needed to place cargo and crew in stable Low Earth Orbit (LEO). This paper examines the systems integration processes NASA is utilizing to ensure integration and control of propulsion and nonpropulsion elements within NASA's Crew Launch Vehicle (CLV), now known as the Ares I. The objective of the Ares I is to provide the transportation capabilities to meet the Constellation Program requirements for delivering a Crew Exploration Vehicle (CEV) or other payload to LEO in support of the lunar and Mars missions. The Ares I must successfully provide this capability within cost and schedule, and with an acceptable risk approach. This paper will describe the systems engineering management processes that will be applied to assure Ares I Project success through complete and efficient technical integration. Discussion of technical review and management processes for requirements development and verification, integrated design and analysis, integrated

simulation and testing, and the integration of reliability, maintainability and supportability (RMS) into the design will also be included. The Ares I Project is logically divided into elements by the major hardware groupings, and associated management, system engineering, and integration functions. The processes to be described herein are designed to integrate within these Ares I elements and among the other Constellation projects. Also discussed is launch vehicle stack integration (Ares I to CEV, and Ground and Flight Operations integration) throughout the life cycle, including integrated vehicle performance through orbital insertion, recovery of the first stage, and reentry of the upper stage. The processes for decomposing requirements to the elements and ensuring that requirements have been correctly validated, decomposed, and allocated, and that the verification requirements are properly defined to ensure that the system design meets requirements, will be discussed.

Author

Ares I Launch Vehicle; Systems Integration; Systems Engineering; Launch Vehicles; Ground Operational Support System; Design Analysis; Engineering Management

20070003140 Air Force Research Lab., Kirkland AFB, NM USA

Multiple Usage of Existing Satellite Sensors (PREPRINT)

Keeney, James T; Jan 2006; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459022; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459022>; Avail.: CASI: A02,

Hardcopy

Satellites in orbit are subjected to severe environmental extremes and an ever increasing risk of collision with resident space objects. Sensors are becoming necessary to observe and measure the proximity of a satellite to determine the risks posed from kinetically approaching manmade and natural hazards. Space offers a near-perfect vacuum to operate a passive or active sensor. Volume, mass and power on satellites is limited and risk management approaches tended to remove such sensors from satellite systems. However, with newer system engineering approaches, the traditional sensors used for navigation and measurement can be used to sense the environment for hazards. A few examples are developed to illustrate the approach to multiple usage sensors and the potential for obtaining more information from previously single function device.

DTIC

Artificial Satellites; Detectors; Satellite Instruments; Satellite Observation

20070003141 Air Force Research Lab., Kirkland AFB, NM USA

Multiple Usage of Existing Satellite Sensors

Keeney, James T; Jul 2006; 6 pp.; In English

Report No.(s): AD-A459023; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459023>; Avail.: CASI: A02,

Hardcopy

Satellites in orbit are subjected to severe environmental extremes and an ever increasing risk of collision with resident space objects. Sensors are becoming necessary to observe and measure the proximity of a satellite to determine the risks posed from kinetically approaching manmade and natural hazards. Space offers a near-perfect vacuum to operate a passive or active sensor. Volume, mass and power on satellites is limited and risk management approaches tended to remove such sensors from satellite systems. However, with newer system engineering approaches, the traditional sensors used for navigation and measurement can be used to sense the environment for hazards. A few examples are developed to illustrate the approach to multiple usage sensors and the potential for obtaining more information from previously single function device.

DTIC

Artificial Satellites; Detectors; Satellite Instruments; Satellite Observation

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*.

20070002146 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization

Shivers, C. Herbert; Wessel, Vernon W.; [2006]; 8 pp.; In English; American Society for Engineering Management, 25-28 Oct. 2006, Huntsville, AL, USA; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002146>; Avail.: CASI: A02,

Hardcopy

NASA implemented a system of technical authority following the Columbia Accident Investigation Board (CAE) report calling for independent technical authority to be exercised on the Space Shuttle Program activities via a virtual organization of personnel exercising specific technical authority responsibilities. After the current NASA Administrator reported for duty, and following the first of two planned 'Shuttle Return to Flight' missions, the NASA Chief Engineer and the Administrator redirected the Independent Technical Authority to a program of Technical Excellence and Technical Authority exercised within the existing engineering organizations. This paper discusses the original implementation of technical authority and the transition to the new implementation of technical excellence, including specific measures aimed at improving safety of future Shuttle and space exploration flights.

Author

Accident Investigation; NASA Programs; Space Missions; Space Shuttles; Aerospace Engineering; Organizations

20070002977 NASA Glenn Research Center, Cleveland, OH, USA

2005 NASA Seal/Secondary Air System Workshop, Volume 1

Steinetz, Bruce M., Editor; Hendricks, Robert C., Editor; October 2006; 557 pp.; In English; 2005 NASA Seal/Secondary Air System Workshop, 8-9 Nov. 2005, Cleveland, OH, USA; See also 20070002978 - 20070003001; Original contains color illustrations

Contract(s)/Grant(s): WBS 581.02.01.03.07

Report No.(s): NASA/CP-2006-214383/VOL1; E-15661-1/VOL1; Copyright; Avail.: CASI: [A24](#), Hardcopy

The 2005 NASA Seal/Secondary Air System workshop covered the following topics: (i) Overview of NASA's new Exploration Initiative program aimed at exploring the Moon, Mars, and beyond; (ii) Overview of the NASA-sponsored Propulsion 21 Project; (iii) Overview of NASA Glenn's seal project aimed at developing advanced seals for NASA's turbomachinery, space, and reentry vehicle needs; (iv) Reviews of NASA prime contractor, vendor, and university advanced sealing concepts including tip clearance control, test results, experimental facilities, and numerical predictions; and (v) Reviews of material development programs relevant to advanced seals development. Turbine engine studies have shown that reducing high-pressure turbine (HPT) blade tip clearances will reduce fuel burn, lower emissions, retain exhaust gas temperature margin, and increase range. Several organizations presented development efforts aimed at developing faster clearance control systems and associated technology to meet future engine needs. The workshop also covered several programs NASA is funding to develop technologies for the Exploration Initiative and advanced reusable space vehicle technologies. NASA plans on developing an advanced docking and berthing system that would permit any vehicle to dock to any on-orbit station or vehicle. Seal technical challenges (including space environments, temperature variation, and seal-on-seal operation) as well as plans to develop the necessary 'androgynous' seal technologies were reviewed. Researchers also reviewed tests completed for the shuttle main landing gear door seals.

Author

Sealing; Turbomachinery; Reentry Vehicles; Research Facilities; Docking; Aerospace Environments; High Pressure

20070002978 GE Global Research Center, Niskayuna, NY, USA

Brush Seals for Improved Steam Turbine Performance

Turnquist, Norman; Chupp, Ray; Baily, Fred; Burnett, Mark; Rivas, Flor; Bowsher, Aaron; Crudginton, Peter; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 107-127; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

GE Energy has retrofitted brush seals into more than 19 operating steam turbines. Brush seals offer superior leakage control compared to labyrinth seals, owing to their compliant nature and ability to maintain very tight clearances to the rotating shaft. Seal designs have been established for steam turbines ranging in size from 12 MW to over 1200 MW, including fossil, nuclear, combined-cycle and industrial applications. Steam turbines present unique design challenges that must be addressed to ensure that the potential performance benefits of brush seals are realized. Brush seals can have important effects on the overall turbine system that must be taken into account to assure reliable operation. Subscale rig tests are instrumental to understanding seal behavior under simulated steam-turbine operating conditions, prior to installing brush seals in the field. This presentation discusses the technical challenges of designing brush seals for steam turbines; subscale testing; performance benefits of brush seals; overall system effects; and field applications.

Derived from text

Steam Turbines; Labyrinth Seals; Elastic Properties; Leakage; Rotating Shafts

20070002979 Pratt and Whitney Aircraft, East Hartford, CT, USA

Advanced Seal Rig Experiments and Analysis

Paolillo, Roger; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 129-147; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Compliant Seals eg. Brush Seals, Finger Seals: a) 3-5X flow reduction; b) developing higher surface speed, temperature, and pressure levels; c) interference/debris/durability issues. Non Contact Seals eg. Aspirating, Film Riding: a) 5-10X flow reduction but still improving surface speed, temperature, and delta pressure levels; b) limited applications; c) interference issues. Labyrinth Seals still the workhorse seal in gas turbine engines: a) long history of use in compressors, turbines, around bearing compartments; b) cheaper to make than many other seals; c) small improvement x many seals (up to 50*) = big gain in performance/operability; d) well and still investigated by academia & industry; e) with a proper abradable seal land can handle interference.

Derived from text

Brush Seals; Labyrinth Seals; Gas Turbines; Elastic Properties; Durability

20070002981 CMG Tech, LLC, Rexford, NY, USA

Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing

Grondahl, Clayton; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 285-307; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

This presentation introduces a shaft seal in which leaf seal elements are constructed from slotted shim material formed and layered into a frusto-conical assembly. Limited elastic deflection of seal leaves with increasing system pressure close large startup clearance to a small, non-contacting, steady state running clearance. At shutdown seal elements resiliently retract as differential seal pressure diminishes. Large seal clearance during startup and shutdown provides a mechanism for rub avoidance. Minimum operating clearance improves performance and non-contacting operation promises long seal life. Design features of this seal, sample calculations at differential pressures up to 2400 psid and benefit comparison with brush and labyrinth seals is documented in paper, AIAA 2005 3985, presented at the Advanced Seal Technology session of the Joint Propulsion Conference in Tucson this past July. In this presentation use of bimetallic leaf material will be discussed. Frictional heating of bimetallic leaf seals during a seal rub can relieve the rub condition to some extent with a change in seal shape. Improved leaf seal rub tolerance is expected with bimetallic material.

Author

Brush Seals; Labyrinth Seals; Seals (Stoppers); Shafts (Machine Elements); Turbines; Bimetals; High Pressure

20070002982 NASA Glenn Research Center, Cleveland, OH, USA

Overview of NASA's Propulsion 21 Effort

Long-Davis, Mary Jo; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 31-43; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Propulsion 21 technologies contribute to reducing CO₂ and NO(x) emissions and noise. Integrated Government/Industry/University research efforts have produced promising initial technical results. Graduate students from 5 partnering universities will benefit from this collaborative research--\g educating the future engineering workforce. Phase 2 Efforts scheduled to be completed 3QFY06.

Derived from text

Carbon Dioxide; Propulsion; Industries

20070002983 Applied Innovation Alliance, LLC, West Bloomfield, MI, USA

Mapping of Technological Opportunities-Labyrinth Seal Example

Clarke, Dana W., Sr.; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 525-542; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

All technological systems evolve based on evolutionary sequences that have repeated throughout history and can be abstracted from the history of technology and patents. These evolutionary sequences represent objective patterns and provide considerable insights that can be used to proactively model future seal concepts. This presentation provides an overview of how to map seal technology into the future using a labyrinth seal example. The mapping process delivers functional descriptions of sequential changes in market/consumer demand, from today's current paradigm to the next major paradigm shift. The future paradigm is developed according to a simple formula: the future paradigm is free of all flaws associated with the current paradigm; it is as far into the future as we can see. Although revolutionary, the vision of the future paradigm is

typically not immediately or completely realizable nor is it normally seen as practical. There are several reasons that prevent immediate and complete practical application, such as: 1) Some of the required technological or business resources and knowledge not being available; 2) Availability of other technological or business resources are limited; and/or 3) Some necessary knowledge has not been completely developed. These factors tend to drive the Total Cost of Ownership or Utilization out of an acceptable range and revealing the reasons for the high Total Cost of Ownership or Utilization which provides a clear understanding of research opportunities essential for future developments and defines the current limits of the immediately achievable improvements. The typical roots of high Total Cost of Ownership or Utilization lie in the limited availability or even the absence of essential resources and knowledge necessary for its realization. In order to overcome this obstacle, step-by-step modification of the current paradigm is pursued to evolve from the current situation toward the ideal future, i.e., evolution rather than revolution. A key point is that evolutionary stages are mapped to show step-by-step evolution from the current paradigm to the next major paradigm.

Derived from text

Sequencing; Labyrinth Seals; Technologies; Commerce; Defects

20070002984 NASA Glenn Research Center, Cleveland, OH, USA

Elastomeric Seal Development for Advanced Docking/Berthing System

Daniels, Christopher; Oswald, Jay; Dunlap, Patrick; Steinetz, Bruce; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 465-484; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Elastomeric seals are being considered for application to the Advanced Docking / Berthing System. Currently, three candidate elastomers are being evaluated. To meet the unique requirements of the ADBS, several test fixtures have been built to determine each elastomer's Environmental and operating temperature compatibility Material stability when exposed to Atomic Oxygen and Ultraviolet radiation Adhesion force required to separate Compression set Leak rate These results will be compared with those from the metallic seal development to determine the final seal design

Derived from text

Docking; Spacecraft Docking; Elastomers; Leakage; Thermal Stability; Ambient Temperature

20070002985 NASA Glenn Research Center, Cleveland, OH, USA

NASA's Exploration Architecture

Tyburski, Timothy; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 1-29; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A Bold Vision for Space Exploration includes: 1) Complete the International Space Station; 2) Safely fly the Space Shuttle until 2010; 3) Develop and fly the Crew Exploration Vehicle no later than 2012; 4) Return to the moon no later than 2020; 5) Extend human presence across the solar system and beyond; 6) Implement a sustained and affordable human and robotic program; 7) Develop supporting innovative technologies, knowledge, and infrastructures; and 8) Promote international and commercial participation in exploration.

Derived from text

Space Exploration; Space Shuttles; Robotics; International Space Station

20070002986 Diversitech, Inc., Cincinnati, OH, USA

Rotating Intershaft Brush Seal Project

Krawiecki, Stephen; Mehta, Jayesh; Holloway, Gary; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 239-283; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The pursuit of high Mach number flight presents several challenges to the airframe and engine design engineers. Most obvious is the resulting high temperatures encountered as the aircraft approaches Mach 3 and above. The encountered high temperatures and shaft speeds of engines require rethinking in the areas of material selections, component design and component operating life. In the area of sump compartment sealing, one of the most difficult sealing applications is the sealing of an engine's rear sump. Normally this sump will need some method of sealing between two rotating shafts. This sealing operation is done with an intershaft seal. The aft sump region also presents an additional design requirement for the intershaft seal. This region has to absorb the engine's thermal growth, which means that in the seal area, axial movement, on the order of 0.30 in., between the rotating shafts must be tolerated. A new concept or new technology of sealing an intershaft sump configuration is being developed. This concept, called a rotating intershaft brush seal has key attributes that will allow this

seal to perform better, in the demanding environment of sealing an aft sump with two rotating shafts, when compared to today's sealing technology of labyrinth and carbon seal

Author

Brush Seals; High Temperature; Sealing; Engine Design; Shafts (Machine Elements); Rotating Shafts

20070002987 NASA Glenn Research Center, Cleveland, OH, USA

NASA In-Situ Resource Utilization Project and Seals Challenges

Sacksteder, Kurt; Linne, Diane; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 399-410; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A viewgraph presentation on NASA's In-Situ Resource Utilization Project and Seals Challenges is shown. The topics include: 1) What Are Space Resources?; 2) Space Resource Utilization for Exploration; 3) ISRU Enables Affordable, Sustainable & Flexible Exploration; 4) Propellant from the Moon Could Revolutionize Space Transportation; 5) NASA ISRU Capability Roadmap Study, 2005; 6) Timeline for ISRU Capability Implementation; 7) Lunar ISRU Implementation Approach; 8) ISRU Technical-to-Mission Capability Roadmap; 9) ISRU Resources & Products of Interest; and 10) Challenging Seals Requirements for ISRU.

CASI

In Situ Resource Utilization; Seals (Stoppers); NASA Space Programs; Space Missions

20070002989 Axiam, Inc., Gloucester, MA, USA

Gas Turbine Engine Carbon Oil Seals Computerized Assembly

Lee, Robert; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 361-384; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

In a bearing compartment there are a series of parts when assembled determine the location of the bearing and seal as related to the centerline of rotation. We see part datums that do not establish a coincident path from the bearing to the seal. High engine vibration can cause severe oil leakage. The inability of the seal to respond fast enough to the rotating element
Radial Seal: Sensitive to housing air pressure Sensitive to seal runout ? Axial Seal: Very sensitive to seal perpendicularity to shaft. Goals include: 1) Repeatable assembly process; 2) Accurate assembly process; 3) Minimize seal runout; 4) Design to engine centerline of rotation, i.e. bearings.

Derived from text

Seals (Stoppers); Shafts (Machine Elements); Gas Turbine Engines; Leakage; Gas Pressure

20070002990 Advanced Products Co., East Greenwich, CT, USA

High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications

More, Greg; Datta, Amit; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 429-442; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A viewgraph presentation on metallic high temperature static seal development at NASA for gas turbine applications is shown. The topics include: 1) High Temperature Static Seal Development; 2) Program Review; 3) Phase IV Innovative Seal with Blade Alloy Spring; 4) Spring Design; 5) Phase IV: Innovative Seal with Blade Alloy Spring; 6) PHase IV: Testing Results; 7) Seal Seating Load; 8) Spring Seal Manufacturing; and 9) Other Applications for High Temperature Spring Design
CASI

Gas Turbine Engines; High Temperature; Metals; Seals (Stoppers); Fabrication; Propulsion System Performance

20070002991 NASA Glenn Research Center, Cleveland, OH, USA

Investigations of Shuttle Main Landing Gear Door Environmental Seals

Finkbeiner, Joshua; DeMange, Jeff; Dunlap, Pat; Steinetz, Bruce; Newswander, Daniel; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 443-463; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The Columbia Accident investigation Board (CAIB) requested an investigation into the MLG door seals. Initially, the MLG door seals were thought to have been a potential contributor to the loss of Columbia. These suspicions were later found to be untrue, but the seals remained as a cause for concern in future flights. MLG door seals comprised of thermal barrier and environmental seal. This study focuses on the environmental seal for the MLG door.

CASI

Accident Investigation; Doors; Landing Gear; Space Shuttles; Seals (Stoppers); Columbia (Orbiter)

20070002992 NASA Glenn Research Center, Cleveland, OH, USA

Overview of Space Environment Effects on Materials and GRC's Test Capabilities

Banks, Bruce A.; Miller, Sharon K. R.; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 484-505; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

The Electro-Physics Branch at NASA Glenn Research Center has been involved with evaluating the durability of materials and understanding environment interactions for over 20 years. A combination of flight experiments, ground based exposure facilities, and environmental modeling provide a well rounded approach to material durability evaluation and prediction for future missions. Ground based testing includes atomic oxygen exposure facilities (large and small area thermal facilities and directed atomic oxygen with and without VUV radiation, VUV and NUV exposure facility, and thermal cycling facility with and without UV radiation. A lunar dust exposure facility is also being brought on-line. Material reactions in these facilities is compared to that observed in space.

Derived from text

Aerospace Environments; Thermal Cycling Tests; On-Line Systems; Life (Durability); Environment Effects; Monte Carlo Method

20070002994 NASA Glenn Research Center, Cleveland, OH, USA

An Update on Structural Seal Development at NASA GRC

Dunlap, Pat; Steinetz, Bruce; Finkbeiner, Josh; DeMange, Jeff; Taylor, Shawn; Daniels, Chris; Oswald, Jay; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 411-428; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

A viewgraph presentation describing advanced structural seal development for NASA exploration is shown. The topics include: 1) GRC Structural Seals Team Research Areas; 2) Research Areas & Objective; 3) Wafer Seal Geometry/Flow Investigations; 4) Wafer Seal Installation DOE Study; 5) Results of Wafer Seal Installation DOE Study; 6) Wafer Geometry Study: Thickness Variations; 7) Wafer Geometry Study: Full-Size vs. Half-Size Wafers; 8) Spring Tube Seal Development; 9) Resiliency Improvement for Rene 41 Spring Tube; 10) Spring Tube Seals: Go-Forward Plan; 11) High Temperature Seal Preloader Development: TZM Canted Coil Spring; 12) TZM Canted Coil Spring Development; 13) Arc Jet Test Rig Development; and 14) Arc Jet Test Rig Status.

CASI

Structural Engineering; Seals (Stoppers); Hypersonics; NASA Programs; Wafers

20070002995 NASA Johnson Space Center, Houston, TX, USA

Advanced Docking Berthing System Update

Lewis, James; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 385-398; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

In FY05 the Exploration Systems Technology Maturation Program selected the JSC advanced mating systems development to continue as an in-house project. In FY06, as a result of ESAS Study (60 Day Study) the CEV Project (within the Constellation Program) has chosen to continue the project as a GFE Flight Hardware development effort. New requirement for CEV to travel and dock with the ISS in 2011/12 in support of retiring the Shuttle and reducing the gap of time where US does not have any US based crew launch capability. As before, long-duration compatible seal-on-seal technology (seal-on-seal to support androgynous interface) has been identified as a risk mitigation item.

Derived from text

Docking; Systems Engineering; Constellations

20070002996 Akron Univ., Akron, OH, USA

Numerical Simulations and an Experimental Investigation of a Finger Seal

Braun, Minel; Pierson, Hazel; Li, H.; Dong, Dingeng; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 309-359; In English; See also 20070002977; Original contains color and black and white illustrations; Copyright; Avail.: CASI: [A04](#), Hardcopy

Besides sealing, the other main goal of a successful finger seal design is to exhibit appropriate compliance to outside forces. The ability of the seal to ride or float along the rotor without rubbing or excessive heating is essential to the successful operation of the seal. The compliance of the finger must only occur in the radial plane; The seal needs to be as sturdy as possible in the axial direction. The compliant finger that moves radially outward with rotor growth and motion has to be able

to ride the rotor back down as the rotor diameter recovers or the rotor moves 'away'. Thus there is an optimum stiffness for the finger.

Derived from text

Elastic Properties; Sealing; Rotors

20070003000 NASA Glenn Research Center, Cleveland, OH, USA

Overview of NASA Glenn Seal Project

Steinetz, Bruce M.; Dunlap, Patrick; Proctor, Margaret; Delgado, Irebert; Finkbeiner, Josh; DeMange, Jeff; Daniels, Christopher C.; Taylor, Shawn; Oswald, Jay; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 45-78; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

NASA Glenn is currently performing seal research supporting both advanced turbine engine development and advanced space vehicle/propulsion system development. Studies have shown that decreasing parasitic leakage through applying advanced seals will increase turbine engine performance and decrease operating costs. Studies have also shown that higher temperature, long life seals are critical in meeting next generation space vehicle and propulsion system goals in the areas of performance, reusability, safety, and cost. NASA Glenn is developing seal technology and providing technical consultation for the Agency's key aero- and space technology development programs.

Author

Leakage; Aerospace Engineering; Turbine Engines; Systems Engineering; Engine Design

20070003001 United Technologies Corp., East Hartford, CT, USA

High Misalignment Carbon Seals for the Fan Drive Gear System Technologies

Shaughnessy, Dennis; Dobek, Lou; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 149-166; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Aircraft engines of the future will require capability bearing compartment seals than found in current engines. Geared systems driving the fan will be subjected to inertia and gyroscopic forces resulting in extremely high angular and radial misalignments. Because of the high misalignment levels, compartment seals capable of accommodating angularities and eccentricities are required. Pratt & Whitney and Stein Seal Company selected the segmented circumferential carbon seal as the best candidate to operate at highly misaligned conditions. Initial seal tests established the misalignment limits of the current technology circumferential seal. From these results a more compliant seal configuration was conceived, designed, fabricated, and tested. Further improvements to the design are underway and plans are to conduct a durability test of the next phase configuration. A technical approach is presented, including design modification to a 'baseline' seal, carbon grade selection, test rig configuration, test plan and results of analysis of seal testing.

Derived from text

Sealing; Seals (Stoppers); Carbon; Elastic Properties; Aircraft Engines

20070003492 NASA Langley Research Center, Hampton, VA, USA

Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments

DeLoach, Richard; Rayos, Elonsio M.; Campbell, Charles H.; Rickman, Steven L.; Larsen, Curtis E.; [2007]; 23 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 515.02.01.07.03.01.05

Report No.(s): AIAA Paper 2007-0550; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070003492>; Avail.: CASI: [A03](#), Hardcopy

Complex computer codes are used to estimate thermal and structural reentry loads on the Shuttle Orbiter induced by ice and foam debris impact during ascent. Such debris can create cavities in the Shuttle Thermal Protection System. The sizes and shapes of these cavities are approximated to accommodate a code limitation that requires simple 'shoebox' geometries to describe the cavities -- rectangular areas and planar walls that are at constant angles with respect to vertical. These approximations induce uncertainty in the code results. The Modern Design of Experiments (MDOE) has recently been applied to develop a series of resource-minimal computational experiments designed to generate low-order polynomial graduating functions to approximate the more complex underlying codes. These polynomial functions were then used to propagate cavity geometry errors to estimate the uncertainty they induce in the reentry load calculations performed by the underlying code. This

paper describes a methodological study focused on evaluating the application of MDOE to future operational codes in a rapid and low-cost way to assess the effects of cavity geometry uncertainty.

Author

Computer Programs; Space Shuttle Orbiters; Space Shuttles; Damage Assessment; Space Debris; Impact Damage

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*.

20070002147 NASA Marshall Space Flight Center, Huntsville, AL, USA

Impact of Solar Array Designs on High Voltage Operations

Brandhorst, Henry W., Jr.; Ferguson, Dale; Piszczor, Mike; O'Neill, Mark; [2006]; 1 pp.; In English; International Astronautical Congress, 2-5 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; Copyright; Avail.: CASI: [A01](#), Hardcopy

As power levels of advanced spacecraft climb above 25 kW, higher solar array operating voltages become attractive. Even in today's satellites, operating spacecraft buses at 100 V and above has led to arcing in GEO communications satellites, so the issue of spacecraft charging and solar array arcing remains a design problem. In addition, micrometeoroid impacts on all of these arrays can also lead to arcing if the spacecraft is at an elevated potential. For example, tests on space station hardware disclosed arcing at 75V on anodized Al structures that were struck with hypervelocity particles in Low Earth Orbit (LEO) plasmas. Thus an understanding of these effects is necessary to design reliable high voltage solar arrays of the future, especially in light of the Vision for Space Exploration of NASA. In the future, large GEO communication satellites, lunar bases, solar electric propulsion missions, high power communication systems around Mars can lead to power levels well above 100 kW. As noted above, it will be essential to increase operating voltages of the solar arrays well above 80 V to keep the mass of cabling needed to carry the high currents to an acceptable level. Thus, the purpose of this paper is to discuss various solar array approaches, to discuss the results of testing them at high voltages, in the presence of simulated space plasma and under hypervelocity impact. Three different types of arrays will be considered. One will be a planar array using thin film cells, the second will use planar single or multijunction cells and the last will use the Stretched Lens Array (SLA - 8-fold concentration). Each of these has different approaches for protection from the space environment. The thin film cell based arrays have minimal covering due to their inherent radiation tolerance, conventional GaAs and multijunction cells have the traditional cerium-doped microsheet glasses (of appropriate thickness) that are usually attached with Dow Corning DC 93-500 silicone adhesive. In practice, these cover glasses and adhesive do not cover the cell edges. Finally, in the SLA, the entire cell and cell edges are fully encapsulated by a cover glass that overhangs the cell perimeter and the silicone adhesive covers the cell edges providing a sealed environment. These three types of blanket technology have been tested at GRC and Auburn. The results of these tests will be described. For example, 15 modules composed of four state-of-the-art 2x4 cm GaAs solar cells with 150 pm cover glasses connected in two-cell series strings were tested at high voltage, in plasma under hypervelocity impact. A picture of one of the modules is shown in figure 1. These were prepared by standard industry practice from a major supplier and had efficiencies above 18%. The test results and other fabrication factors that influenced the tests will be presented. In addition, results for SLA segments tested under the same conditions will be presented. Testing of thin film blankets at GRC will also be presented. Figure 1 : Typical GaAs Solar Cell Module These results will show significant differences in resistance to arcing that are directly related to array design and manufacturing procedures. Finally, the approaches for mitigating the problems uncovered by these tests will be described. These will lay the foundation for future higher voltage array operation, even including voltages above 300-600 V for direct drive SEP applications.

Author

Fabrication; High Voltages; Solar Arrays; Spacecraft Design; Communication Satellites

20070002160 NASA Marshall Space Flight Center, Huntsville, AL, USA

NASA Crew Launch Vehicle Flight Test Process

Davis, Stephan R.; Robinson, Kimberly F.; Sullivan, Gregory P.; Tuma, Margaret L.; [2006]; 1 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

In response to the Vision for Space Exploration, the National Aeronautics and Space Administration (NASA) has defined

a new space exploration architecture to return humans to the Moon and to prepare for human exploration of Mars. One of the first new developments will be the Crew Launch Vehicle (CLV), which will carry the Crew Exploration Vehicle (CEV) into Low Earth Orbit (LEO) to support International Space Station (ISS) missions and, later, to support lunar missions. As part of the CLV development, NASA will perform a series of CLV flight tests. The tests will provide data that will inform the engineering and design process and verify the flight hardware and software. In addition, the data gained from the flight tests will be used to certify the new CLV/CEV vehicle for human space flight. This paper will provide an overview of the CLV flight test process and details of the individual flight tests

Author

Launch Vehicles; Flight Tests; International Space Station; Space Exploration; Low Earth Orbits

20070002668 NASA Marshall Space Flight Center, Huntsville, AL, USA

Boom Rendezvous Alternative Docking Approach

Bonometti, Joseph A.; 2006; 13 pp.; In English; AIAA Space 2006 Conference, 19-21 Sep. 2006, San Jose, CA, USA; Original contains black and white illustrations

Report No.(s): AIAA Paper 2006-7239; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002668>; Avail.: CASI: A03, Hardcopy

Space rendezvous and docking has always been attempted with primarily one philosophic methodology. The slow matching of one vehicle's orbit by a second vehicle and then a final closing sequence that ends in matching the orbits with perfect precision and with near zero relative velocities. The task is time consuming, propellant intensive, risk inherent (plume impingement, collisions, fuel depletion, etc.) and requires substantial hardware mass. The historical background and rationale as to why this approach is used is discussed in terms of the path-not-taken and in light of an alternate methodology. Rendezvous and docking by boom extension is suggested to have inherent advantages that today's technology can readily exploit. Extension from the primary spacecraft, beyond its inherent large inertia, allows low inertia connections to be made rapidly and safely. Plume contamination issues are eliminated as well as the extra propellant mass and risk required for the final thruster (docking) operations. Space vehicle connection hardware can be significantly lightened. Also, docking sensors and controls require less fidelity; allowing them to be more robust and less sensitive. It is the potential safety advantage and mission risk reduction that makes this approach attractive, besides the prospect of nominal time and mass savings.

Author

Space Rendezvous; Spacecraft Docking; Spacecraft Orbits; Spacecraft Configurations; Booms (Equipment)

20070002802 NASA Marshall Space Flight Center, Huntsville, AL, USA

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets

Daso, Endwell O.; Pritchett, Victor E.; Wang, Ten-See; Blankson, Isiah M.; Auslender, Aaron H.; [2006]; 3 pp.; In English; AIAA/AHI 14th International Space Planes and Hypersonics Systems and Technologies Conference, 6-9 Nov. 2006, Canberra, Australia; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002802>;

Avail.: CASI: A01, Hardcopy

One of the technical challenges in long-duration space exploration and interplanetary missions is controlled entry and re-entry into planetary and Earth atmospheres, which requires the dissipation of considerable kinetic energy as the spacecraft decelerates and penetrates the atmosphere. Efficient heat load management of stagnation points and acreage heating remains a technological challenge and poses significant risk, particularly for human missions. An innovative approach using active flow control concept is proposed to significantly modify the external flow field about the spacecraft in planetary atmospheric entry and re-entry in order to mitigate the harsh aerothermal environments, and significantly weaken and disperse the shock-wave system to reduce aerothermal loads and wave drag, as well as improving aerodynamic performance. To explore the potential benefits of this approach, we conducted fundamental experiments in a trisonic blow down wind tunnel to investigate the effects of counterflowing sonic and supersonic jets against supersonic freestreams to gain a better understanding of the flow physics of the interactions of the opposing flows and the resulting shock structure.

Author

Active Control; Reentry; Supersonic Jet Flow; Thermal Stresses; Energy Dissipation; Flow Distribution; Kinetic Energy; Aerodynamic Loads; Aerothermodynamics; Atmospheric Entry

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*.

20070002792 NASA, Washington, DC, USA

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA)

Gwaltney, David A.; Bauer, Guenther; Jakovljevic, Mirko; Gagea, Leonard; Motzet, Guenter; [2006]; 18 pp.; In English; 2006 MAPLD International Conference, 26-28 Sep. 2006, Washington, DC, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

This viewgraph presentation is a review of the Time Triggered Protocol, designed to work with NASA's Integrated Safety-Critical Advanced Avionics Communication and Control (ISAACC) system. ISAACC is the product of the Propulsion High-Impact Avionics Technologies (PHIAT) project at NASA Marshall Space Flight Center (MSFC) during FY03 to the end of FY05. The goal is an avionics architecture suitable for control and monitoring of safety critical systems of manned spacecraft. It must be scalable to allow its use in robotic vehicles or launch pad and propulsion test stand monitoring and control systems. The developed IMA should have: a common power supply and rugged chassis for a set of modules, many upgradeable software functions on one module (i.e. processing unit Reduced weight, straightforward update and system integration. It is also important that it have Partitioning and a Memory Management Unit (MMU)

CASI

Avionics; Modules; Systems Integration; Astrionics; Flight Management Systems; Systems Engineering; Control Systems Design

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*.

20070002134 International Trade Commission, Washington, DC USA

Outboard Engines from Japan. Investigation No. 731-TA-1069 (Preliminary)

Mar. 2004; 90 pp.; In English

Report No.(s): PB2007-101183; USITC/PUB-3673; No Copyright; Avail.: CASI: [A05](#), Hardcopy

On the basis of the record developed in the subject investigation, the USA International Trade Commission determines that there is a reasonable indication that an industry in the USA is materially injured by reason of imports from Japan of outboard engines and powerheads, provided for in the Harmonized Tariff Schedule of the USA That are alleged to be sold in the USA at less than fair value (LTFV).

NTIS

Japan; International Trade; Engines

20070002143 NASA Marshall Space Flight Center, Huntsville, AL, USA

RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration

Kynard, Michael H.; McArthur, J. Craig; Ise, Dayna S.; [2006]; 3 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002143>; Avail.: CASI: [A01](#), Hardcopy

A key element of the National Vision for Space Exploration is the development of a heavy-lift Cargo Launch Vehicle (CaLV). Missions to the Moon, Mars, and beyond are only possible with the logistical capacity of putting large payloads in low-earth orbit. However, beyond simple logistics, there exists the need for this capability to be as cost effective as possible to ensure mission sustainability. An element of the CaLV project is, therefore, the development of the RS-25, which represents the evolution of the proven Space Shuttle Main Engine (SSME) into a high-performance, cost-effective expendable rocket engine. The development of the RS-25 will be built upon the foundation of over one million seconds of accumulated hot-fire time on the SSME. Yet in order to transform the reusable SSME into the more cost-effective, expendable RS-25 changes will have to be made. Thus the project will inevitably strive to maintain a balance between demonstrated heritage products and

processes and the utilization of newer technology developments. Towards that end, the Core Stage Engine Office has been established at the NASA Marshall Space Flight Center to initiate the design and development of the RS-25 engine. This paper is being written very early in the formulation phase of the RS-25 project. Therefore the focus of this paper will be to present the scope, challenges, and opportunities for the RS-25 project. Early schedules and development decisions and plans will be explained. For not only must the RS-25 project achieve cost effectiveness through the development of new, evolved components such as a channel-wall nozzle, a new HIP-bonded main combustion chamber, and several others, it must simultaneously develop the means whereby this engine can be manufactured on a scale never envisioned for the SSME. Thus, while the overall project will span the next eight to ten years, there is little doubt that even this schedule is aggressive with a great deal of work to accomplish.

Author

Space Shuttle Main Engine; Space Exploration; Launch Vehicles; Heavy Lift Launch Vehicles; Spacecraft Design; Launching; Rocket Engines

20070002634 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Space Propulsion Technology Program Solar Electric Propulsion Technologies

Dankanich, John W.; [2006]; 1 pp.; In English; Division for Planetary Sciences Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002634>; Avail.: CASI: C01, CD-ROM: A01, Hardcopy

NASA's In-space Propulsion (ISP) Technology Project is developing new propulsion technologies that can enable or enhance near and mid-term NASA science missions. The Solar Electric Propulsion (SEP) technology area has been investing in NASA's Evolutionary Xenon Thruster (NEXT), the High Voltage Hall Accelerator (HiVHAC), lightweight reliable feed systems, wear testing, and thruster modeling. These investments are specifically targeted to increase planetary science payload capability, expand the envelope of planetary science destinations, and significantly reduce the travel times, risk, and cost of NASA planetary science missions. Status and expected capabilities of the SEP technologies are reviewed in this presentation. The SEP technology area supports numerous mission studies and architecture analyses to determine which investments will give the greatest benefit to science missions. Both the NEXT and HiVHAC thrusters have modified their nominal throttle tables to better utilize diminished solar array power on outbound missions. A new life extension mechanism has been implemented on HiVHAC to increase the throughput capability on low-power systems to meet the needs of cost-capped missions. Lower complexity, more reliable feed system components common to all electric propulsion (EP) systems are being developed. ISP has also leveraged commercial investments to further validate new ion and hall thruster technologies and to potentially lower EP mission costs.

Author

Solar Electric Propulsion; Technology Utilization; NASA Space Programs; General Overviews

20070002635 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Development of NASA's Low Thrust Trajectory Tool Set

Sims, Jon; Artis, Gwen; Kos, Larry; [2006]; 1 pp.; In English; Division for Planetary Sciences Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: C01, CD-ROM: A01, Hardcopy

Highly efficient electric propulsion systems can enable interesting classes of missions; unfortunately, they provide only a limited amount of thrust. Low-thrust (LT) trajectories are much more difficult to design than impulsive-type (chemical propulsion) trajectories. Previous low-thrust (LT) trajectory optimization software was often difficult to use, often had difficulties converging, and was somewhat limited in the types of missions it could support. A new state-of-the-art suite (toolbox) of low-thrust (LT) tools along with improved algorithms and methods was developed by NASA's MSFC, JPL, JSC, and GRC to address the needs of our customers to help foster technology development in the areas of advanced LT propulsion systems, and to facilitate generation of similar results by different analysts.

Derived from text

Low Thrust; Trajectory Optimization; NASA Space Programs; Trajectory Analysis; Space Missions

20070002823 NASA Marshall Space Flight Center, Huntsville, AL, USA

Recent Advances in Solar Sail Propulsion at NASA

Johnson, Les; Young, Roy M.; Montgomery, Edward E., IV; [2006]; 8 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain

Report No.(s): IAC-06-C4.6.01; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002823>; Avail.: CASI: A02, Hardcopy

Supporting NASA's Science Mission Directorate, the In-Space Propulsion Technology Program is developing solar sail propulsion for use in robotic science and exploration of the solar system. Solar sail propulsion will provide longer on-station operation, increased scientific payload mass fraction, and access to previously inaccessible orbits for multiple potential science missions. Two different 20-meter solar sail systems were produced and successfully completed functional vacuum testing last year in NASA Glenn's Space Power Facility at Plum Brook Station, Ohio. The sails were designed and developed by ATK Space Systems and L'Garde, respectively. These sail systems consist of a central structure with four deployable booms that support the sails. This sail designs are robust enough for deployments in a one atmosphere, one gravity environment, and are scalable to much larger solar sails-perhaps as much as 150 meters on a side. In addition, computation modeling and analytical simulations have been performed to assess the scalability of the technology to the large sizes (\g150 meters) required for first generation solar sails missions. Life and space environmental effects testing of sail and component materials are also nearly complete. This paper will summarize recent technology advancements in solar sails and their successful ambient and vacuum testing.

Author

Solar Sails; Propulsion; Aerospace Systems; Environment Effects; Gravitation; Payloads

20070002856 International Trade Commission, Washington, DC USA

Outboard Engines from Japan. Investigation No. 731-TA-1069 (Final)

Feb. 2005; 180 pp.; In English

Report No.(s): PB2007-101223; USITC/PUB-3752; No Copyright; Avail.: CASI: [A09](#), Hardcopy

On the basis of the record developed in the subject investigation, the USA International Trade Commission (Commission) determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. section 1673d(b)) (the Act), that an industry in the USA is not materially injured or threatened with material injury, and the establishment of an industry in the USA is not materially retarded, by reason of imports from Japan of outboard engines and powerheads, provided for in subheading 8407.21.00 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce (Commerce) to be sold in the USA at less than fair value (LTFV).

NTIS

Japan; Engine Design

20070002997 Radatec, LLC, Atlanta, GA, USA

Microwave Blade Tip Clearance System: An Update

Geisheimer, Jon; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 199-221; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Newer engines use compressor bleed air and a model to close clearances open loop. Measuring clearances and closing the control loop can add additional efficiencies. Tip clearance control has been identified as a key technology for future engines. Additional benefits in prognostics, NSMS, and condition-based maintenance. In the HPT for every 1 mil improvement in clearance: a) SFC decreases 0.1%; and b) EGT margin increases 1 C.

Derived from text

Blade Tips; Clearances; Compressors; Efficiency

20070003494 NASA Marshall Space Flight Center, Huntsville, AL, USA, Science Applications International Corp., Huntsville, AL, USA

Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems

Byers, Dave; [2006]; 1 pp.; In English; Division for Planetary Sciences Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: [C01](#), CD-ROM: [A01](#), Hardcopy

This poster presentation reviews the the benefits of the use of advanced propellants, the tasks required for use of the bipropellant systems and usages that the system would be used for.

CASI

Liquid Rocket Propellants; Propulsion System Configurations; Propulsion System Performance; Spacecraft Propulsion

CHEMISTRY AND MATERIALS (GENERAL)

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

20070002131 International Trade Commission, Washington, DC USA

Barium Carbonate from China. Investigation No. 731-TA-1020 (Final)

Sep. 2003; 88 pp.; In English

Report No.(s): PB2007-101182; USITC/PUB-3631; No Copyright; Avail.: CASI: [A05](#), Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission determines that an industry in the USA is materially injured by reason of imports from China of barium carbonate, provided for in the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce to be sold in the USA at less than fair value (LTFV).

NTIS

Barium; Carbonates; China

20070002159 NASA Marshall Space Flight Center, Huntsville, AL, USA

Fluorescence Approaches to Growing Macromolecule Crystals

Pusey, Marc; Forsythe, Elizabeth; Achari, Aniruddha; [2006]; 2 pp.; In English

Contract(s)/Grant(s): GM071581-01; Copyright; Avail.: Other Sources; Abstract Only

Trace fluorescent labeling, typically $\sim 1\%$, can be a powerful aid in macromolecule crystallization. Precipitation concentrates a solute, and crystals are the most densely packed solid form. The more densely packed the fluorescing material, the more brightly the emission from it, and thus fluorescence intensity of a solid phase is a good indication of whether one has crystals or not. The more brightly fluorescing crystalline phase is easily distinguishable, even when embedded in an amorphous precipitate. This approach conveys several distinct advantages: one can see what the protein is doing in response to the imposed conditions, and distinguishing between amorphous and microcrystalline precipitated phases are considerably simpler. The higher fluorescence intensity of the crystalline phase led us to test if we could derive crystallization conditions from screen outcomes which had no obvious crystalline material, but simply 'bright spots' in the precipitated phase. Preliminary results show that the presence of these bright spots, not observable under white light, is indeed a good indicator of potential crystallization conditions.

Author

Crystallization; Macromolecules; Amorphous Materials; Proteins; Precipitates; Microcrystals; Fluorescence

20070002587 UT-Battelle, LLC, Oak Ridge, TN, USA

Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc

Ott, R. D.; Blue, C. A.; Dudney, N. J.; Harper, D. C.; 30 Jul 04; 6 pp.; In English

Contract(s)/Grant(s): DE-AC05-00OR22725

Patent Info.: Filed Filed 30 Jul 04; US-Patent-Appl-SN-10-903-071

Report No.(s): PB2007-103786; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A method of thermally processing a material includes exposing the material to at least one pulse of infrared light emitted from a directed plasma arc to thermally process the material, the pulse having a duration of no more than 10 s.

NTIS

Patent Applications; Plasma Jets; Plasmas (Physics)

20070002589 Battelle Memorial Inst., Columbus, OH USA

Electrosynthesis of Nanofibers and Nano-Composite Films

Lin, Y.; Liang, L.; Liu, J.; 22 Sep 05; 18 pp.; In English

Contract(s)/Grant(s): DE-AC0676RL01830

Patent Info.: Filed Filed 22 Sep 05; US-Patent-Appl-SN-11/233/632

Report No.(s): PB2007-103784; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method for producing an array of oriented nanofibers that involves forming a solution that includes at least one electroactive species. An electrode substrate is brought into contact with the solution. A current density is applied to the electrode substrate that includes at least a first step of applying a first substantially constant current density for a first time

period and a second step of applying a second substantially constant current density for a second time period. The first and second time periods are of sufficient duration to electrically deposit on the electrode substrate an array of oriented nanofibers produced from the electroactive species. Also disclosed are films that include arrays or networks of oriented nanofibers and a method for amperometrically detecting or measuring at least one analyte in a sample.

NTIS

Electrochemical Synthesis; Patent Applications

20070002748 Robinson-Page-McDonough and Associates, Inc., Greenland, NH USA

Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration

Robinson, Rodney A; Sep 1993; 56 pp.; In English

Report No.(s): AD-A458642; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458642>; Avail.: CASI: [A04](#), Hardcopy

This Task has investigated the benefits derived from the projects sponsored during the past 4 years by SNAME Ship Production Committee Panel SP-3 on Surface Preparation and Coatings under the National Shipbuilding Research Program. This Task is an update to an earlier survey (1989) covering the previous 15 years. It has found that those projects offering timely information and assistance to the shipyard community in the surface preparation and coatings areas have yielded the most value. It has also found that the projects performed since the last survey generally have yielded more benefit value to the shipyard community than the earlier projects, an indication that during the past few years the Panel has become better aligned with shipyard needs. This Task has also assessed the opinion of the shipyard using community on the administration and management of Panel SP-3 itself. It has found that the practices currently in effect have been well received, and should be continued with only minor improvements. In regard to NSRP matters in general, however, the survey has revealed major concern about the length and uncertainty of the project finding cycle. It also points out difficulties in achieving and maintaining an awareness of NSRP matters throughout the shipyard community, and with the timely distribution to Panel participants of information on NSRP projects and activities. These concerns should be examined and treated promptly, as the future success of the NSRP may well depend on it.

DTIC

Coatings; Procedures; Preparation; Surfaces

20070002760 Woodcock Washburn LLP, Philadelphia, PA, USA

Thyronamine Derivatives and Analogs and Methods of Use Thereof

Scalan, T. S.; Hart, M. E.; Bunzow, J. R.; Grandy, D. K.; Miyakawa, M.; 16 Apr 04; 92 pp.; In English

Contract(s)/Grant(s): NIH-DK52798; NIH-DA10703

Patent Info.: Filed Filed 16 Apr 04; US-Patent-Appl-SN-10-825 881

Report No.(s): PB2007-100868; No Copyright; Avail.: CASI: [A05](#), Hardcopy

Thyronamine derivatives and analogs, methods of using such compounds, and pharmaceutical compositions containing them are disclosed. Methods of preparing such compounds are also disclosed.

NTIS

Charts; Patent Applications; Pharmacology

20070002770 Massachusetts Univ., Amherst, MA, USA

Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly

Emrick, T. S.; Breitenkamp, K.; 3 Sep 04; 21 pp.; In English

Contract(s)/Grant(s): NSF-CHE0239486

Patent Info.: Filed Filed 3 Sep 04; US-Patent-Appl-SN-10-934 084

Report No.(s): PB2007-100865; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Polymer capsules from amphiphilic graft copolymers comprising reactive, hydrophobic polyolefin backbones, and hydrophilic poly(ethylene glycol) (PEG) grafts are produced by self-assembly of the polymers at the oil-water interface, and crosslinking the assembly with bis-cyclooctene PEG derivatives in conjunction with ring-open metathesis polymerization catalysts. The use of the graft copolymer architecture in capsule synthesis provides significant opportunities to tune both the surface properties, in terms of recognition, and the membrane properties, in terms of mechanical strength, encapsulation, and release.

NTIS

Ethylene Compounds; Glycols; Patent Applications

20070002772 Liniak, Berenato and White, LLC, Bethesda , MD, USA

Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom

Torkelson, J. M.; Lebovitz, A.; Kasimatis, K.; Khait, K.; 5 Nov 03; 11 pp.; In English

Contract(s)/Grant(s): NSF-DMR-0076097

Patent Info.: Filed Filed 5 Nov 03; US-Patent-Appl-SN-10-701 067

Report No.(s): PB2007-100864; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method of producing a polymer-clay nanocomposite comprises providing a supply of polymer-clay mixture, exfoliating the mixture through solid-state shear pulverization in the presence of cooling sufficient to maintain the extruded mixture in the solid state during the pulverization, and discharging the resulting exfoliated mixture. The invention is also directed to a method of producing a polymer hybrid nanocomposite, wherein a component is dispersed throughout a polymer matrix by solid-state shear pulverization of a polymer mixed with the second component.

NTIS

Clays; Nanocomposites; Patent Applications

20070002773 Whitham, Curtis and Christofferson, PC, Reston, VA, USA

Sulfonamide Cannabinoid Agonists and Antagonists

Martin, B. R.; Razdan, R. K.; Pertwee, R. G.; 24 Jun 03; 16 pp.; In English

Contract(s)/Grant(s): NIDA-DA-05488; NIDA-DA-03672

Patent Info.: Filed Filed 24 Jun 03; US-Patent-Appl-SN-10-601 757

Report No.(s): PB2007-100862; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Cannabinoid agonists and antagonists are provided for use in the treatment of disorders such as acute and chronic pain, inflammation, loss of appetite, convulsions, multiple sclerosis, nausea and vomiting. The cannabinoid agonists and antagonists contain a sulfonamide moiety incorporated into the cannabinoid side chain, and the side chain itself may be saturated or unsaturated.

NTIS

Patent Applications; Sulfonates; Convulsions; Nausea

20070002796 International Trade Commission, Washington, DC USA

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary)

Jul. 2003; 113 pp.; In English

Report No.(s): PB2007-101197; USITC/PUB-3608; No Copyright; Avail.: CASI: [A06](#), Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission (Commission) determines, pursuant to sections 703(a) and 733(a) of the Tariff Act of 1930 (19 U.S.C. section 1671b(a) and 1673b(a)) (the Act), there is no reasonable indication that an industry in the USA is materially injured or threatened with material injury, or that the establishment of an industry in the USA is materially retarded, by reason of imports from China, Germany, and India of certain 4,4'-diamino-2, 2'-stilbenedisulfonic acid chemistry, provided for in subheadings 2921.59.20 and 3204.20.80 of the Harmonized Tariff Schedule of the USA, that is alleged to be subsidized by the Government of India and that is alleged to be sold in the USA at less than fair value (LTFV).

NTIS

China; Germany; India; International Trade; Toxicology

20070002815 International Trade Commission, Washington, DC USA

Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final)

Jun. 2005; 184 pp.; In English

Report No.(s): PB2007-101225; USITC/PUB-3787; No Copyright; Avail.: CASI: [A09](#), Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission (Commission) determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. section 1673d(b)) (the Act), that an industry in the USA is materially injured by reason of imports from Finland, Mexico, the Netherlands, and Sweden of purified carboxymethylcellulose, provided for in subheading 3912.31.00 of the Harmonized Tariff Schedule of the USA, that

have been found by the Department of Commerce (Commerce) to be sold in the USA at less than fair value (LTFV).
NTIS

Cellulose; Finland; International Trade; Netherlands; Sweden

20070002819 NASA Marshall Space Flight Center, Huntsville, AL, USA

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth

Ray, Chandra S.; Ramachandran, Narayanan; [2006]; 1 pp.; In English; International Conference on Solidification and Processing, 20-23 Nov. 2006, Jaipur, India; Copyright; Avail.: Other Sources; Abstract Only

Experiments conducted up to this time on glass forming melts in the low gravity environment of space show that glasses prepared in low-g are more chemically homogeneous and more resistant to crystallization than the comparable glasses prepared at 1-g on Earth. This result is somewhat surprising and opposite to the accepted concept on glass formation for a melt. A hypothesis based on 'shear thinning' of a melt, a decrease in viscosity with increasing shear stress, is proposed as an explanation for the observed low-gravity results. This paper describes detailed simulation procedures to test the role of thermal convection in introducing shear stress in glass forming melts, using a lithium disilicate melt as a model. The simulation system in its idealized version consists of a cylinder that is heated at one end and cooled at the other with gravity acting in a transverse direction to the thermal gradient. The side wall of the cylinder is assumed to be insulating. The governing equations of motion and energy are solved using variable properties for viscosity (Arrhenius and non-Arrhenius behaviors) and density (constant and temperature dependent). Other parametric variables in the calculations include gravity level and gravity vector orientation. The shear stress in the system are then computed as a function of gravity from the calculated values of maximum melt velocity, and its effect on melt viscosity (shear thinning) is predicted. Also included and discussed are the modeling efforts related to other potential convective processes in glass forming melts and their possible effects on melt viscosity.

Author

Glass; Microgravity; Crystallization; Melts (Crystal Growth); Temperature Dependence; Computerized Simulation; Free Convection; Shear Stress

20070002853 International Trade Commission, Washington, DC USA

Artists' Canvas from China. Investigation No. 731-TA-1091 (Final)

May 2006; 203 pp.; In English

Report No.(s): PB2007-101228; USITC/PUB-3853; No Copyright; Avail.: CASI: [A10](#), Hardcopy

On the basis of the record developed in the subject investigation, the USA International Trade Commission (Commission) determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. section 1673d(b)) (the Act), that an industry in the USA is materially injured by reason of imports from China of artists' canvas, provided for in subheadings 5901.90.20 and 5901.90.40 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce (Commerce) to be sold in the USA at less than fair value (LTFV).

NTIS

China; Fabrics; International Trade

20070002860 World Technology Evaluation Center, Baltimore, MD, USA

WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe

Beaman, J. J.; Atwood, C.; Bergman, T. L.; Bourell, D.; Hollister, S.; Dec. 2004; 154 pp.; In English

Contract(s)/Grant(s): NSF-ENG-0104476; ONR-N00014-03-1-809

Report No.(s): PB2007-103563; Copyright; Avail.: National Technical Information Service (NTIS)

This report is a review of additive/subtractive manufacturing techniques in Europe. Otherwise known as Solid Freeform Fabrication (SFF), this approach has resided largely in the prototyping realm, where the methods of producing complex freeform solid objects directly from a computer model without part-specific tooling or knowledge started. But these technologies are evolving steadily and are beginning now to encompass related systems of material addition, subtraction, assembly, and insertion of components made by other processes. Furthermore, these various additive/subtractive processes are starting to evolve into rapid manufacturing techniques for mass-customized products, away from narrowly defined rapid prototyping. Taking this idea far enough down the line, and several years hence, a radical restructuring of manufacturing as we know it could take place. Not only would the time to market be slashed, manufacturing itself would move from a resource base to a knowledge base and from mass production of single use products to mass customized, high value, life cycle products. At the time of the panel's visit, the majority of SFF research and development in Europe was focused on advanced development of existing SFF technologies by improving processing performance, materials, modeling and simulation tools,

and design tools to enable the transition from prototyping to manufacturing of end use parts. Specific examples include: laser sintering of powders, direct metal deposition and laser fusion of powders, and ink jet printing techniques.

NTIS

Additives; Europe; Manufacturing

20070002903 NASA Glenn Research Center, Cleveland, OH, USA

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings

Bansal, Narottam P.; Zhu, Dongming; December 2006; 14 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 489.02.07.03.06

Report No.(s): NASA/TM-2006-214483; E-15775; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002903>;

Avail.: CASI: [A03](#), Hardcopy

Pyrochlore oxides of general composition, $A_2B_2O_7$, where A is a 3(+) cation (La to Lu) and B is a 4(+) cation (Zr, Hf, Ti, etc.) have high melting point, relatively high coefficient of thermal expansion, and low thermal conductivity which make them suitable for applications as high-temperature thermal barrier coatings. The effect of doping at the A site on the thermal conductivity of a pyrochlore oxide $La_2Zr_2O_7$, has been investigated. Oxide powders of various compositions $La_2Zr_2O_7$, $La(1.7)Gd(0.3)Zr_2O_7$, $La(1.7)Yb(0.3)Zr_2O_7$ and $La(1.7)Gd(0.15)Yb(0.15)Zr_2O_7$ were synthesized by the citric acid sol-gel method. These powders were hot pressed into discs and used for thermal conductivity measurements using a steady-state laser heat flux test technique. The rare earth oxide doped pyrochlores $La(1.7)Gd(0.3)Zr_2O_7$, $La(1.7)Yb(0.3)Zr_2O_7$ and $La(1.7)Gd(0.15)Yb(0.15)Zr_2O_7$ had lower thermal conductivity than the un-doped $La_2Zr_2O_7$. The Gd_2O_3 and Yb_2O_3 co-doped composition showed the lowest thermal conductivity.

Author

Thermal Control Coatings; Thermal Conductivity; Doped Crystals; Low Conductivity; Sol-Gel Processes; Thermal Expansion

20070002913 Lawrence Livermore National Lab., Livermore, CA USA

Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine

Pitz, W. J.; Naik, C. V.; Mhaolduin, T. N.; Curran, H. J.; Orme, J. P.; Oct. 13, 2005; 16 pp.; In English

Report No.(s): DE2006-885391; UCRL-CONF-216161; No Copyright; Avail.: National Technical Information Service (NTIS)

A new mechanism for the oxidation of methylcyclohexane has been developed. The mechanism combined a newly-developed low temperature mechanism with a previously developed high temperature mechanism. Predictions from the chemical kinetic model have been compared to experimentally measured ignition delay times from a rapid compression machine. Predicted ignition delay times using the initial estimates of the methylcyclohexyl peroxy radical isomerization rate constants were much longer than those measured at low temperatures. The initial estimates of isomerization rate constants were modified based on the experimental findings of Gulati and Walker that indicate a much slower rate of isomerization. Predictions using the modified rate constants for isomerizations yielded faster ignition at lower temperatures that greatly improved the agreement between model predictions and the experimental data. These findings point to much slower isomerization rates for methylcyclohexyl peroxy radicals than previously expected.

NTIS

Ignition; Oxidation; Cyclohexane; Methyl Compounds

20070003146 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field

McDonald, Shannon S; Jan 2006; 68 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459030; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459030>; Avail.: CASI: [A04](#), Hardcopy

A prototype rapid, high volume air sampling device based on Solid Phase Microextraction (SPME) has been developed for the collection of trace level volatile organic compounds (VOCs). The High Surface Area-Solid Phase Microextraction (HSASPM) device contains ten times more polymer than traditional SPME fibers and is uniquely designed to optimize compound uptake at higher flow rates. This study evaluated the extraction efficiency at six air sampling flow rates ranging from 0.1 L/min to 10 L/min and compared total compound extraction at the two extreme flow rates. A 10 ppb(v) concentration of 39 volatile organic compounds was used. Carboxen/Poly(dimethylsiloxane) and Poly(dimethylsiloxane) polymer coatings

were evaluated using an Agilent 6890N/5973, a resistively heated Low Thermal Mass Gas Chromatograph column and an Entech 7100 Preconcentrator. Larger extraction efficiencies were observed at lower flow rates, but the higher flow rates proved superior in total compound extraction per unit time. Across the range of compounds, the HSASPME device achieved an average 8-fold increase in compound uptake at a flow rate of 10 L/min as compared to 0.1 L/min.

DTIC

Extraction; Organic Compounds; Samplers; Solid Phases; Volatile Organic Compounds

20070003266 Army Research Lab., Aberdeen Proving Ground, MD USA

Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel

Bundy, Mark; Garner, James; Garcia, Gerald; Baylor, Robert; Marrs, Terry; Pitts, Julius; Vanina, Bob; Sep 2006; 14 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459257; ARL-TR-3946; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459257>; Avail.:

CASI: A03, Hardcopy

A new solventless bore cleaning technique, marketed by GI Industries, is currently under review by the U.S. Army Research Laboratory, Benet Laboratory, and the Aberdeen Test Center. Previous studies have shown that this new cleaning system is efficient at removing propellant residue/glaze without producing any measurable bore wear. This report speaks to both the subtle question of whether or not this new method of cleaning roughens the surface finish; but more importantly, it addresses health and safety issues if the process is applied to barrels having fired depleted uranium rounds. As reported herein, the surface finish is unchanged by the cleaning process. Furthermore, a pre- and post-cleaned radiological survey of a contaminated barrel showed no transport of radioactivity to the cleaning device components, or within the evacuated cleaning dust. The broader implications of the later test are that depleted uranium contamination, when present, lies within the barrel metal, which is not removed in the cleaning process.

DTIC

Cavities; Cleaning; Contamination; Guns (Ordnance); Surface Finishing

20070003354 Rasco, Inc., Woodbridge, VA USA

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products

Eskelund, G; Garragan, G; Feb 1993; 66 pp.; In English

Contract(s)/Grant(s): DACA31-92-P-1062

Report No.(s): AD-A459440; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459440>; Avail.: CASI: A04,

Hardcopy

In December, 1991 the USA Army undertook a full-scale effort to remove Volatile Organic Compounds (VOCs) from contaminated soils at the Industrial Waste Treatment Plant (IWTP) Lagoon at Letterkenny Army Depot (LEAD) near Chambersburg, Pennsylvania. The Low Temperature Thermal Treatment process used had previously undergone successful pilot studies in the K-area. It is the objective of this report to review data from both the studies and the full-scale operation at LEAD for the purpose of evaluating those factors that influence the selection of this technology for the remediation of soils elsewhere. Included in this report is scale-up efficiencies, costs, physical parameters and comparisons of low temperature thermal stripping technologies used in soil remediation. This report is designed to disseminate practical, implementation-related information to minimize, selection, design, costing, and construction problems associated with Low Temperature Volatile Systems (LTVS).

DTIC

Contamination; Desorption; Hydrocarbons; Low Temperature; Petroleum Products; Soils; Solvents; Volatile Organic Compounds

24

COMPOSITE MATERIALS

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

20070002568 Sandia National Labs., Albuquerque, NM USA, Arquin Corp., La Luz, NM, USA

Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation

Ho, C. K.; Bibeau, T. A.; Jun. 2006; 32 pp.; In English

Report No.(s): DE2006-887483; SAND2006-3750; No Copyright; Avail.: National Technical Information Service (NTIS)

Finite-element analyses were performed to simulate the response of a hypothetical masonry shear wall with and without continuous filament ties to various lateral loads. The loads represented three different scenarios: (1) 100 mph wind, (2) explosive attack, and (3) an earthquake. In addition, a static loading analysis and cost comparison were performed to evaluate optimal materials and designs for the spacers affixed to the filaments. Results showed that polypropylene, ABS, and polyethylene (high density) were suitable materials for the spacers based on performance and cost, and the short T-spacer design was optimal based on its performance and functionality. Results of the shear-wall loading simulations revealed that simulated walls with the continuous filament ties yielded factors of safety that were at least ten times greater than those without the ties. In the explosive attack simulation (100 psi), the simulated wall without the ties failed (minimum factor of safety was less than one), but the simulated wall with the ties yielded a minimum factor of safety greater than one. Simulations of the walls subject to lateral loads caused by 100 mph winds (0.2 psi) and seismic events with a peak ground acceleration of 1 g (0.66 psi) yielded no failures with or without the ties. Simulations of wall displacement during the seismic scenarios showed that the wall with the ties resulted in a maximum displacement that was 20% less than the wall without the ties.

NTIS

Dynamic Loads; Finite Element Method; Masonry

20070002577 Michigan State Univ., East Lansing, MI, USA

Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products

Matuana, L.; Carlborn, K.; 21 Jul 05; 18 pp.; In English

Patent Info.: Filed Filed 21 Jul 05; US-Patent-Appl-SN-11-186-065

Report No.(s): PB2007-103792; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Wood particles or fibers and a maleated polyolefin are used to produce a composite in absence of a non-maleated polyolefin. The composite has properties enabling use in homes and avoiding the risk of formaldehyde based adhesives or other hazardous air pollutants.

NTIS

Composite Materials; Patent Applications; Wood; Alkenes; Polymers

20070002625 UT-Battelle, LLC, Oak Ridge, TN, USA

Composite, Nanostructured, Super-Hydrophobic Material

D'Urso, B. R.; Simpson, J. T.; 27 Jul 05; 12 pp.; In English

Contract(s)/Grant(s): DE-AC05-00OR22725

Patent Info.: Filed Filed 27 Jul 05; US-Patent-Appl-SN-10-800-249

Report No.(s): PB2007-103814; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A hydrophobic disordered composite material having a protrusive surface feature includes a recessive phase and a protrusive phase, the recessive phase having a higher susceptibility to a preselected etchant than the protrusive phase, the composite material having an etched surface wherein the protrusive phase protrudes from the surface to form a protrusive surface feature, the protrusive feature being hydrophobic.

NTIS

Composite Materials; Hydrophobicity; Patent Applications

20070002627 UT-Battelle, LLC, Oak Ridge, TN, USA

Composite, Ordered Material Having Sharp Surface Features

D'Urso, B. R.; Simpson, J. T.; 27 Jul 05; 27 pp.; In English

Contract(s)/Grant(s): DE-AC05-00O422725

Patent Info.: Filed Filed 27 Jul 05; US-Patent-Appl-SN-10-900-248

Report No.(s): PB2007-103813; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A composite material having sharp surface features includes a recessive phase and a protrusive phase, the recessive phase having a higher susceptibility to a preselected etchant than the protrusive phase, the composite material having an etched surface wherein the protrusive phase protrudes from the surface to form a sharp surface feature. The sharp surface features can be coated to make the surface super-hydrophobic.

NTIS

Composite Materials; Patent Applications

20070002671 NASA Marshall Space Flight Center, Huntsville, AL, USA

Composites Damage Tolerance Workshop

Gregg, Wayne; [2006]; 24 pp.; In English; MSFC Damage Tolerance of Composites Workshop, 23-24 Oct. 2006, Huntsville, AL, USA; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002671>; Avail.: CASI: A03, Hardcopy

The Composite Damage Tolerance Workshop included participants from NASA, academia, and private industry. The objectives of the workshop were to begin dialogue in order to establish a working group within the Agency, create awareness of damage tolerance requirements for Constellation, and discuss potential composite hardware for the Crew Launch Vehicle (CLV) Upper Stage (US) and Crew Module. It was proposed that a composites damage tolerance working group be created that acts within the framework of the existing NASA Fracture Control Methodology Panel. The working group charter would be to identify damage tolerance gaps and obstacles for implementation of composite structures into manned space flight systems and to develop strategies and recommendations to overcome these obstacles.

Author

Composite Structures; Damage; Tolerances (Mechanics); Mechanical Properties; Manned Space Flight

20070002788 Illinois Univ., Urbana-Champaign, IL, USA

Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanosstructure Synthesis

Weaver, J. H.; January 2006; 7 pp.; In English

Report No.(s): DE2006-885433; No Copyright; Avail.: Department of Energy Information Bridge

From our work at the University of Minnesota prior to 2000, we knew that buffer-layer-assisted growth could be used to produce abrupt interfaces where reactions were constrained by the fact that particles derived from tens to millions of atoms were brought into contact with substrates that ranged from GaAs(110) to BiSrCaCuO superconductors. In situ scanning tunneling microscopy had demonstrated that the particles increased in size with the thickness of the buffer layer, and we postulated that buffer desorption somehow 'tossed the particles around' so that aggregation was possible. Through access to transmission electron microscopy in the MRL at the University of Illinois, we have been able to determine the distribution of particles delivered to amorphous carbon as a function of buffer thickness, buffer material, particle material, and warm up rate so as to reveal the physics underlying diffusion, aggregation, and coalescence. Significantly, this enhanced understanding makes it possible to design experiments that produce sizes and distributions of nanoparticles of a very wide range of materials.

NTIS

Epitaxy; Nanoclusters; Nanostructures (Devices); Substrates; Elastic Properties

20070003329 Ohio State Univ., Columbus, OH USA

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials

Ghosh, Somnath; Oct 27, 2006; 197 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0428

Report No.(s): AD-A459374; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459374>; Avail.: CASI: A09, Hardcopy

This work develops an adaptive concurrent multi-level computational model for multi-scale analysis of composite structures undergoing damage initiation and growth due to microstructural damage induced by debonding at the fiber-matrix interface. The model combines macroscopic computations using a continuum damage model with explicit micromechanical computations, including explicit debonding at the fiber-matrix interface. Macroscopic computations are done by conventional FEM models while the Voronoi cell FEM is used for micromechanical analysis. Three hierarchical levels of different resolution adaptively evolve to improve the accuracy of solutions. For micromechanical analysis, an eXtended Voronoi cell finite element model (X-VCFEM) is developed for modeling multiple cohesive crack propagation in brittle materials. The incremental crack directions and growth lengths are determined in terms of the cohesive energy near the crack tip. In addition to polynomial terms, stress functions include branch functions in conjunction with level set methods and multi-resolution wavelet functions. Next the X-VCFEM is used to model interfacial debonding with arbitrary matrix cohesive cracking in fiber-reinforced composites. Initiation and propagation of debonding depends not only on the total cohesive energy, but also on the traction-displacement curve. Finally, a VCFEM is also developed for transient elastodynamic analysis in time domain is developed.

DTIC

Composite Materials; Damage; Dynamic Models; Failure; Heterogeneity; Mathematical Models; Scale Models

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*.

20070002699 NASA Marshall Space Flight Center, Huntsville, AL, USA

Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence

Segars, Matt G.; [2006]; 15 pp.; In English; International Workshop on Pollution Prevention and Sustainable Development, 1-2 Nov. 2006, Colorado Springs, CO, USA; Original contains black and white illustrations

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

The Shuttle Environmental Assurance Initiative (SEA) has identified a potential for the Space Shuttle Program (SSP) to incur materials obsolescence issues due to agreements between the fluoro-chemical industry and the USA Environmental Protection Agency (USEPA) to participate in a Global Stewardship Program for perfluorooctanoic acid (PFOA). This presentation will include discussions of the chemistry, regulatory drivers, affected types of fluoropolymer and fluoroelastomer products, timeline for reformulations, and methodology for addressing the issue. It will cover the coordination of assessment efforts with the International Space Station and Head Quarters Air Force Space Command, along with some examples of impacted materials. The presentation is directed at all members of the international aerospace community concerned with identifying potential environmentally driven materials obsolescence issues.

Author

Fluoropolymers; Space Shuttles; Acids; NASA Space Programs; Regulations; Organic Chemistry

20070002758 Lawrence Livermore National Lab., Livermore, CA USA

Remote Sensing of Alpha and Beta Sources Modeling Summary

Dignon, J.; Frank, M.; Cherepy, N.; Oct. 20, 2005; 18 pp.; In English

Report No.(s): DE2006-885413; UCRL-TR-216377; No Copyright; Avail.: National Technical Information Service (NTIS)

Evaluating the potential for optical detection of the products of interactions of energetic electrons or other particles with the background atmosphere depends on predictions of change in atmospheric concentrations of species which would generate detectable spectral signals within the range of observation. The solar blind region of the spectrum, in the ultra violet, would be the logical band for outdoor detection. The chemistry relevant to these processes is composed of ion-molecule reactions involving the initially created N^{2+} and O^{2+} ions, and their subsequent interactions with ambient trace atmospheric constituents. Effective modeling of the atmospheric chemical system acted upon by energetic particles requires knowledge of the dominant mechanism that exchange charge and associate it with atmospheric constituents, kinetic parameters of the individual processes, and a solver for the coupled differential equations that is accurate for the very stiff set of time constants involved. The LLNL box model, VOLVO, simulates the diel cycle of trace constituent photochemistry for any point on the globe over the wide range of time scales present using a stiff Gear-type ODE solver, i.e. LSODE. It has been applied to problems such as tropospheric and stratospheric nitrogen oxides, stratospheric ozone production and loss, and tropospheric hydrocarbon oxidation. For this study we have included the appropriate ion flux.

NTIS

Detection; Optical Measurement; Remote Sensing

20070002769 Townsend and Townsend and Crew, LLP, San Francisco, CA, USA, Australian National Univ., Canberra, Australia

Process for the Production of Emulsions and Dispersions

Pashley, R. M.; 5 Nov 03; 25 pp.; In English

Patent Info.: Filed 5 Nov 03; US-Patent-Appl-SN-10-703 094

Report No.(s): PB2007-100863; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods for the formation of colloidal suspensions. The method includes combining an aqueous substance with a second substance that is normally immiscible with the aqueous substance, to form a mixture, and before, during or after the combining removing dissolved gases from one or both of the aqueous and second substance, whereby the aqueous and second substances mix and form a colloidal suspension. The methods for the formation of colloidal suspension include methods for the formation of emulsions as well as particulate dispersions. The methods used to form the colloidal suspensions in accordance with the

present invention produce colloidal suspensions that are stable for periods from an hour to several weeks in the absence of surfactants or stabilizing agents.

NTIS

Colloids; Emulsions; Patent Applications

20070002775 Lawrence Livermore National Lab., Livermore, CA USA

Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations

Wemhoff, A. P.; Burnham, A. K.; Jan. 13, 2006; 52 pp.; In English

Report No.(s): DE2006-888593; UCRL-TR-218130; No Copyright; Avail.: National Technical Information Service (NTIS)

The kinetics of the beta-delta solid-solid phase transformation of HMX (nitramine octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine) were modeled in ALE2D using four similar equilibrium-inhibited nucleation-growth models: a reversible set of Arrhenius kinetics following a LANL model, and three sets of kinetics derived based on an autocatalytic model using the bidirectional reaction formalism. The parameters for the bidirectional kinetics models were calibrated using simulations of two experimental setup scenarios where experimental data is available: 165 C XRD and SITI. In this calibration, the transition enthalpy and activation energy values were kept constant, while the frequency factors were iterated to achieve results similar to those provided by the experiments. This process yielded six unique sets of kinetic parameters that describe the phase transformation: a pair of sets for each of the three bidirectional kinetics models. The models calibrated using 165 C XRD data showed good agreement with LX-04 STEX experimental results, while the SITI-based models were in good agreement with the LANL model and PBX-9501 STEX experimental data. These bidirectional models were also shown to require less computational effort than the LANL model.

NTIS

Calibrating; Computerized Simulation; HMX; Kinetics; Phase Transformations

20070002863 Texas A&M Univ., College Station, TX USA

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides

January 2006; 8 pp.; In English

Report No.(s): DE2006-885420; No Copyright; Avail.: Department of Energy Information Bridge

It has been determined that poorly crystalline CST and SNT prepared at low temperature (100-150 deg. C) exhibit much faster kinetics in uptake of Sr²⁺. 2. In-situ X-ray studies has shown that SNT is a precursor phase to the formation of CST. 3. It is possible to form mixtures of CST and SNT in a single reactant mix by control of temperature and time of reaction. 4. It has been found that addition of a small amount of Cs⁺ to the reactant mix for the preparation of Nb-CST allows formation of the crystals in one day rather than ten days at 200 deg. C. 5. These discoveries suggest that a proper mix of sorbents (SNT, CST, Nb-CST) can be made easily at low cost that would remove all the HLW at the Savannah River site with a single in-tank procedure. Research Objective The basic science goal in this project is to identify structure/affinity relationships for selected radionuclides and existing sorbents. The research will then apply this knowledge to the design and synthesis of sorbents that will exhibit increased cesium, strontium and actinide removal. The target problem focuses on the treatment of high-level nuclear wastes. The general approach can likewise be applied to non-radioactive separations.

NTIS

Actinide Series; Cesium; Design Optimization; Ion Exchanging; Radioactive Isotopes; Radioactive Wastes; Sorbents; Strontium

20070002869 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden

Results from the Swedish National Screening 2005. Subreport 2. Biocides

Remberger, M.; Woldegiorgis, A.; Kaj, L.; Andersson, J.; Cousins, A. M.; Nov. 2006; 67 pp.; In English

Report No.(s): PB2007-103515; IVL-B1700; No Copyright; Avail.: National Technical Information Service (NTIS)

As an assignment from the Swedish Environmental Protection Agency, IVL has performed a 'Screening Study' of the following biocides: bronopol, 4-Chloro-3-cresol, 2-Mercaptobenzothiazole, N-didecyldimethylammoniumchloride (DDMAC), Propiconazole, Resorcinol, 2-(Thiocyanomethylthio) benzothiazole, triclosan, Methyl-, Ethyl-, Propyl-, Butyl- and Benzylparabene. The overall objectives of the screening were to determine concentrations in a variety of media in the Swedish environment, to highlight important transport pathways, and to assess the possibility of current emissions in Sweden. In total, 132 samples of air, precipitation, effluent water, surface water, sludge, sediment, fish, foodstuff and human urine have been analyzed. The background sites were generally non-contaminated, only 2 out of 17 background samples contained detectable amounts of biocides, and in these samples only two substances were found; namely triclosan and 2- mercaptobenzothiazole.

Due to regular presence in samples of wastewater effluents, sludge and urban sediments, on-going emissions are likely to occur for 2-mercaptobenzothiazole, triclosan, DDMAC and parabenes. Observed concentrations were, however, below risk levels. The atmosphere was identified as a possible transport matrix for triclosan, 2-mercaptobenzothiazole and parabenes. Bronopol, resorcinol and 2-(tiocyanomethylthio)-benzothiazole were not detected in any of the samples analyzed, and were considered to pose no environmental risks. Propiconazole may be of local concern but at present it is unlikely to cause any problems on a national level.

NTIS

Pesticides; Methyl Compounds; Ethyl Compounds; Air Pollution

20070002870 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden

Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS)

Woldegiorgis, A.; Andersson, J.; Remberger, M.; Kaj, L.; Ekheden, Y.; Nov. 2006; 49 pp.; In English

Report No.(s): PB2007-103514; IVL-B1698; No Copyright; Avail.: National Technical Information Service (NTIS)

As an assignment from the Swedish Environmental Protection Agency, IVL has during 2005/2006 performed a 'Screening Study' of selected chemicals within the groups of pharmaceuticals, biocides and perfluorinated alkylated substances (PFAS). The selected chemicals are emitted and distributed in the environment via a variety of sources, e.g. point sources and use in consumer products. The overall objectives of the screening were to determine the concentrations of the selected substances in a variety of media in the Swedish environment, to highlight important transport pathways, and to assess the possibility of current emissions in Sweden. A further aim was to investigate the likelihood of atmospheric transport and uptake in biota. This sub-report considers the screening of the selected perfluorinated alkylated substances (PFAS).

NTIS

Air Pollution; Environment Protection; Emittance

20070003011 Air Force Research Lab., Wright-Patterson AFB, OH USA

Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films

Haugan, Timothy J; Barnes, Paul N; Campbell, Timothy A; Evans, Julianna M; Kell, Joseph W; Brunke, Lyle B; Murphy, John P; Varanasi, Chakrapani; Maartense, Iman; Wong-Ng, Winnie; Cook, Lawrence P; Oct 2004; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-3145

Report No.(s): AD-A458772; AFRL-PR-WP-TP-2006-203; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458772>; Avail.: Defense Technical Information Center (DTIC)

Nanoparticle dispersions of various phases were added to YBa₂Cu₃O₇(7-x) (YBCO or 123) thin films by multilayer pulsed laser deposition, to determine their effect on flux pinning. The different pinning materials examined include Y₂BaCuO₅ (Y₂11 or green-phase), La₂BaCuO₅ (La₂11 or brown-phase), Y₂O₃, CeO₂, and MgO, with lattice constant mismatches varying from 0.5% to 12% with respect to YBCO. Y₂11 and Y₂O₃ provided significant pinning increases at temperatures of 65 K and 77 K, however other phases provided enhancements only at 65 K (for CeO₂ and La₂11) for limited range of applied field strengths. An interesting correlation between T_c transition widths and pinning strengths was observed. The additions produced markedly different nanoparticle and film microstructures, as well as superconducting properties.

DTIC

Flux Pinning; Nanoparticles; Thin Films; YBCO Superconductors

20070003090 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Identification of the Compounds Formed During the Low Temperature Heat Dispersal of o-Chlorobenzylidene Malononitrile (CS Riot Control Agent)

Hout, Joseph J; Jun 5, 2006; 61 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458937; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458937>; Avail.: CASI: A04,

Hardcopy

US Army mask confidence training is conducted using low temperature heat-assisted dispersal of encapsulated o-chlorobenzylidene malononitrile (CS riot control agent). This study quantified the CS concentration and identified the CS thermal degradation products detected inside of an Army mask confidence chamber. Degradation products identified in the chamber were compared to those observed in a laboratory setting at temperatures ranging from 150-300 deg. C. The average surface temperature of the Army dispersal system was 257 deg. C and the daily average CS concentration ranged from 2.33

- 3.29 mg/m³. There were 17 CS thermal degradation products identified in the chamber, fifteen of which were identified in the laboratory (one at 150 deg. C and 15 at 300 deg. C). The two additional products detected in the chamber were likely due to molten CS dripping through air holes directly into the heat source. A better CS delivery system that contains the CS and maintains a temperature near 150 deg. C should create the desired CS concentration and hinder the formation of undesirable degradation products.

DTIC

Dispersing; Low Temperature; Malononitrile

20070003110 Wisconsin Univ., Madison, WI USA

New Tools for Measurement of Personal Exposure to Chemical Environments

Abbott, Nicholas L; Jan 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0299

Report No.(s): AD-A458976; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458976>; Avail.: CASI: A03,

Hardcopy

The primary objective of this research was to demonstrate principles based on the orientational behavior of liquid crystals at chemically functionalized surfaces for passive sensing of targeted toxic gases, including chemical warfare agents. Included in this research was the systematic study of the competitive interactions of thermotropic liquid crystals and P-, N- and S-containing compounds with surfaces presenting metal carboxylates. Emphasis was directed to developing principles that lead to highly sensitive and selective ordering transitions in liquid crystals upon exposure of the liquid crystals to targeted chemical agents. ARO support enabled development of a fundamental understanding of metal ion-ligand coordination interactions between liquid crystals possessing nitrile groups and surfaces presenting divalent and trivalent carboxylate complexes. This development relied heavily on the use of infrared spectroscopy and led to the design of chemically tailored surfaces that trigger ordering transitions in liquid crystals upon exposure to parts-per-billion concentrations of dimethylmethylphosphonate and half mustard. Recent experiments performed at DSTL have also demonstrated that these principles can be extended to selectively report VX, GB, GD and GA.

DTIC

Chemical Warfare; Detection; Exposure; Liquid Crystals

20070003172 Army Engineer Research and Development Center, Vicksburg, MS USA

Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures

Hock, Vincent F; Marshall, Orange S; McInerney, Michael K; Morefield, Sean; Malone, Philip; Weiss, Charles; Kleinschmidt, Justin; Harrer, Ann; Holtz, Kristi; Goran, Daniel; Richardson, Kalin; Condon, Robert; Oct 2006; 66 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459075; ERDC-TR-06-9; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459075>; Avail.:

CASI: A04, Hardcopy

Electro-osmotic pulse (EOP) was evaluated in the laboratory to compare the electrokinetic forces developed by the EOP system to the hydraulic forces within 4-in.-thick concrete. Systems were installed in two Civil Works structures, the old lock house at Lock and Dam 7 at Dresbach, MN, and in a section of gallery at Lock 27 at Granite City, IL. Laboratory testing indicates that EOP is able to dry the walls of concrete Civil Works structures up to 30 ft of head through a 4-in.-thick slab of concrete, and that EOP can be used to dry the concrete in lock house basements and lock galleries. The plate cathodes mounted in the water on the lock walls are effective cathode placements. Probe cathodes are also effective embedded in the lock walls. The effectiveness of probe cathodes is based on the surface area and not the manufacturing techniques used.

DTIC

Osmosis; Seepage; Water

20070003179 Princeton Univ., NJ USA

Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces

Jiang, D E; Carter, Emily A; Jan 2005; 11 pp.; In English

Contract(s)/Grant(s): DAAD19-03-1-0022

Report No.(s): AD-A459083; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459083>; Avail.: CASI: A03,

Hardcopy

Deleterious gases such as CO and H₂S can cause degradation of steel by reacting with the metal surface. Here we consider whether alloying the steel surface might be able to inhibit these damaging surface reactions by raising the barriers to molecular

dissociation. We employ first-principles density functional theory techniques to investigate the elementary reaction pathways and barriers for CO and H₂S on FeAl and Fe₃Si surfaces and compare them with pure Fe surfaces (as a model for steel). We find that H₂S dissociates on iron surfaces much more easily than CO does. Although FeAl surfaces raise the barriers for H₂S dissociation, they significantly lower the barriers for CO dissociation. On the other hand, Fe₃Si surfaces raise the barriers for CO dissociation, but they are as vulnerable as Fe surfaces to H₂S dissociation. Our findings suggest that alloying iron with Al or Si is unlikely to simultaneously increase its resistance to the initial stages of chemical degradation by CO and H₂S.

DTIC

Alloying; Alloys; Carbon Monoxide; Hydrogen Sulfide; Steels

20070003270 Scientific Applications and Research Associates, Inc., Cypress, CA USA

Computational Prediction of Kinetic Rate Constants

Altshuler, Dmitry A; Reidy, Denis M; Nov 30, 2006; 20 pp.; In English

Contract(s)/Grant(s): FA9550-05-C-0065

Report No.(s): AD-A459261; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459261>; Avail.: CASI: A03, Hardcopy

Report developed under SBIR/STTR contract for Topic #AF05-T010. The purpose of these efforts was to develop seamless, easy to use, efficient code to calculate electronic wave functions and potential energy surfaces of molecules and predict kinetic rate constants for reactions a priori. Given that an already existing software package, called POLYRATE, contained most of the capabilities desired for this Phase I, early on it was proposed to achieve the required level of calculations by marking modifications to an interface for models to be input into POLYRATE.

DTIC

Computational Chemistry; Constants; Reaction Kinetics

20070003305 Purdue Univ., West Lafayette, IN USA

Neutral Atom Lithography With Multi-Frequency Laser Fields

Elliott, Daniel S; Janes, David B; Jun 2006; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0138

Report No.(s): AD-A459307; 040831A; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459307>; Avail.: CASI: A02, Hardcopy

In this final report we describe our efforts in exposing self-assembled molecular monolayers to a beam of neutral sodium atoms and chemically etching the resulting substrate and characterization of the resulting surface. We also discuss our development of a rubidium magneto-optical trap.

DTIC

Atomic Beams; Laser Outputs; Lithography; Neutral Atoms

20070003306 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

MRS Workshop Explores the Diversity of 3D Multifunctional Ceramic Composites

Braun, Paul V; Dec 2005; 3 pp.; In English

Contract(s)/Grant(s): DAAD19-03-1-0227

Report No.(s): AD-A459310; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459310>; Avail.: CASI: A01, Hardcopy

The MRS Workshop on Three-Dimensional Multifunctional Ceramic Composites was held at the Beckman Institute on the campus of the University of Illinois at Urbana-Champaign (UIUC) October 3-5, 2005. Organized by Paul V. Braun of UIUC, C. Jeffrey Brinker of the University of New Mexico and Sandia National Laboratories, and Shanhui Fan of Stanford University, the workshop reached an audience of about 100 attendees from academic institutions, government laboratories, and private industry. The scientific and technical underpinnings of self-assembly and properties of self-assembled 3D ceramic, composite and semiconductor structures were emphasized. The technical program consisted of invited presentations from renowned experts, along with selected contributed presentations, posters, and hands-on tutorials given by expert faculty. The topics explored included new developments in 3D photonic crystals, chemical and biological sensors, nanoparticle assemblies, rapid fabrication techniques, active membranes, 3D holographic patterning, and modeling and theory of 3D optical devices.

DTIC

Ceramic Matrix Composites; Ceramics; Three Dimensional Composites

20070003319 North Carolina State Univ., Raleigh, NC USA

Structural Analysis and Bioengineering of Thermostable Pyrococcus Furiosus Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification

Du, Julie; Grunden, Amy M; Tove, Sherry R; Jun 2006; 34 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAG55-98-D-0003

Report No.(s): AD-A459340; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459340>; Avail.: CASI: A03, Hardcopy

prolidase, aminopeptidase, dinuclear metal center, organophosphorus nerve agent, cobalt enzyme, Pyrococcus furiosus, biodecontamination The aims of this project were to structurally study and bioengineer thermostable prolidase from Pyrococcus furiosus to enable its use for organophosphorus nerve agent detoxification. Prolidase contains one dinuclear Co metal-center/monomer and has optimal activity at 100 C, exhibiting no activity in the absence of Co²⁺ or at temperatures \leq 50 C. Requirement for metal ions is characteristic of all organophosphorus nerve agent hydrolases and results from these enzymes containing dinuclear metal-centers with one tight-binding metal atom and a second loose-binding metal atom. One primary objective of this study was to determine which of the metal sites is integral and which is labile, information that will be used to bioengineer prolidases. Another objective was to produce P. furiosus prolidase mutants that have increased catalytic activity over a lower range of temperatures using random mutation and a low-temperature selection method. Three mutant prolidases targeting metal-binding amino acids have been successfully produced and biochemical analysis has demonstrated that the Co1 metal-binding site is the high-affinity site and the Co2 site, the low-affinity site. Conditions for selection of mutant prolidases with increased activity at lower temperatures have been determined and mutant prolidases (G39E and E236V) isolated that have higher activity than wild type at 37 C.

DTIC

Bioengineering; Nerves; Organic Phosphorus Compounds; Structural Analysis; Thermostats

20070003321 Wisconsin Univ., Madison, WI USA

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles

Carpick, Robert W; Eriksson, Mark A; Aug 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0102

Report No.(s): AD-A459346; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459346>; Avail.: CASI: A03, Hardcopy

We have investigated the role of interfacial chemistry, friction, and mass on the behavior of collections of microparticles and nanoparticles. These objects are the potential building blocks of any number of nanoscale and microscale devices and machines. To create such devices, a 'nano-factory' is required, where creative combinations of 'top-down' and 'bottom-up' approaches are integrated to create a versatile and reliable factory. A key component of such a factory is a conveyor belt system for mechanically transporting, separating by mass and chemical species, and aligning nanoparticles in controlled ways. The conveyor belt needs to be chemically versatile, and hence organic/polymeric in nature. The nature of inertial motion is intimately connected to the interface between the particle and substrate on which it lies. A key to understanding the influence of this complex interface is to systematically vary the contact between components and observe the changes in behavior. We have gained an understanding of the role of interfacial chemistry, friction, and particle mass in this dynamic system.

DTIC

Chemical Reactions; Collection; Conveyors; Friction; Inertia; Microparticles; Motion; Nanoparticles; Surface Reactions

20070003337 Illinois Univ., Urbana, IL USA

Design Rules for High Temperature Microchemical Systems

Masel, Richard I; Oct 25, 2006; 35 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0582

Report No.(s): AD-A459407; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459407>; Avail.: CASI: A03, Hardcopy

The key objective of the work so far was to do the science needed to design better microburners and microreactors for soldier power and other applications. Microcombustion has gone from 'impossible' to routine. Microreactors for ammonia reforming shrank by more than a factor of 100. Computational models exist where none existed before.

DTIC

Chemical Reactors; Combustion; High Temperature

20070003344 Maine Univ., Orono, ME USA

Development of a Rapid Decontamination System for the Nerve Agents

Patterson, Howard H; Sep 15, 2006; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0246

Report No.(s): AD-A459416; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459416>; Avail.: CASI: A03,

Hardcopy

Catalysts using Ag⁺ and Fe₂O₃ as dopants on sodalite, Y zeolite and MCM-41 supports were investigated in order to develop a more efficient and safe catalyst for the photodecomposition of dangerous nerve agents. Ag-sodalite, Ag/Fe₂O₃-sodalite, Ag-Y zeolite, Ag-MCM-41 and Ag/Fe₂O₃-Y zeolite were all synthesized by ion exchange techniques and characterized by X-ray diffraction, solid state luminescence spectroscopy, and atomic absorption spectroscopy. The Y zeolite-based catalysts show significant spectroscopic differences between the Ag-doped and the Ag and Fe₂O₃-doped varieties. Catalyst performance studies involving each of the synthesized catalysts were conducted using carbaryl as the reactant and varying wavelengths of UV light as photon sources for the experiments. Catalyst performance studies were also carried out using nerve agents as the target molecules at the Edgewood Chemical and Biological Center. While catalysts perform differently depending on the excitation wavelength used, the Ag-sodalite catalyst at 280 nm excitation shows the most promise for its efficiency and stability. Also, the inclusion of Fe₂O₃ as a dopant does not enhance catalytic activity. Reactions using Ag-sodalite at 280 nm excitation involving either sodium bicarbonate as a hydroxyl radical scavenger or D₂O as solvent show that hydroxyl radicals may play a role in the reaction mechanism.

DTIC

Catalysis; Decontamination; Nerves; Photodecomposition; X Ray Diffraction; Zeolites

20070003351 Princeton Univ., NJ USA

First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes

Carter, Emily A; Aug 14, 2005; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-05-1-0053

Report No.(s): AD-A459432; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459432>; Avail.: CASI: A03,

Hardcopy

This presents the final report for 1.5 years of research at Princeton by the PI and her group on the gun tube erosion problem. During this period, a new quantum mechanics simulation tool was developed and interfacial materials chemistry aspects of the gun tube erosion problem were investigated. Specifically, ultrasoft spin-dependent pseudopotential density functional theory (DFT) was developed, which provides an accurate and efficient ab initio description of magnetic transition metals such as Fe. DFT was used to evaluate the structure and stability of a multilayer protective coating for steel comprised of MoSi₂ and SiO₂, as an alternative for the usual chrome coating. Properties of the Cr/Fe interface were also calculated and the origin of the stability of the chrome coating identified. Pathways for common propellants CO and H₂S adsorption, diffusion, and dissociation on Fe and Fe alloy surfaces were also investigated. These findings were reported in five journal publications, with two more publications in press.

DTIC

Erosion; Guns (Ordnance); Protective Coatings; Spallation

26

METALS AND METALLIC MATERIALS

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

20070002129 International Trade Commission, Washington, DC USA

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary)

Apr. 2004; 138 pp.; In English

Report No.(s): PB2007-101211; USITC/PUB-3685; No Copyright; Avail.: CASI: A07, Hardcopy

The USA International Trade Commission (ITC) today determined that a U.S. industry is materially injured by reason of imports of magnesium from China and Russia that the U.S. Department of Commerce has determined are sold in the USA at less than fair value. As a result of the Commission's affirmative determinations, the U.S. Department of Commerce will issue antidumping duty orders on imports of magnesium from China and Russia. The Commerce Department previously made an affirmative critical circumstances determination with regard to certain of these imports from China. Therefore, the Commissioners who made an affirmative injury determination today are required to determine whether the imports are likely

to undermine seriously the remedial effect of the antidumping duty order Commerce will issue. All six Commissioners made negative findings with regard to critical circumstances. As a result, the antidumping duty order concerning these imports will not apply to subject goods that entered the USA prior to October 4, 2004, the date of the Department of Commerce's affirmative preliminary determination.

NTIS

China; Magnesium; Russian Federation; Ukraine; International Trade

20070002485 NASA Ames Research Center, Moffett Field, CA, USA

Application of Density Functional Theory to Systems Containing Metal Atoms

Bauschlicher, Charles W., Jr.; [2006]; 1 pp.; In English; International Conference on Electron Correlation: From Atomes to Biomolecules, Sep. 1-4, 1997, Castle of Orenas, Sweden

Contract(s)/Grant(s): RTOP 242-80-01; No Copyright; Avail.: Other Sources; Abstract Only

The accuracy of density functional theory (DFT) for problems involving metal atoms is considered. The DFT results are compared with experiment as well as results obtained using the coupled cluster approach. The comparisons include geometries, frequencies, and bond energies. The systems considered include MO₂, M(OH)_n, MNO⁺, and MCO₂. The DFT works well for frequencies and geometries, even in case with symmetry breaking; however, some examples have been found where the symmetry breaking is quite severe and the DFT methods do not work well. The calculation of bond energies is more difficult and examples of successes as well as failures of DFT will be given.

Author

Atoms; Metals; Binding Energy; Ground State

20070002572 Wright State Univ., Dayton, OH, USA

Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006)

Srinivasan, R.; Chaudhury, P. K.; Cherukuri, B.; Han, Q.; Swenson, D.; January 2006; 72 pp.; In English

Report No.(s): DE2006-885079; No Copyright; Avail.: National Technical Information Service (NTIS)

Metals with grain sizes smaller than 1- μ m have received much attention in the past decade. These materials have been classified as ultra fine grain (UFG) materials (grain sizes in the range 100 to 1000-nm) and nano-materials (grain size \leq 100-nm) depending on the grain size. This report addresses the production of bulk UFG metals through the use of severe plastic deformation processing, and their subsequent use as stock material for further thermomechanical processing, such as forging. A number of severe plastic deformation (SPD) methods for producing bulk UFG metals have been developed since the early 1990s. The most promising of these processes for producing large size stock that is suitable for forging is the equal channel angular extrusion or pressing (ECAE/P) process. This process involves introducing large shear strain in the workpiece by pushing it through a die that consists of two channels with the same cross-sectional shape that meet at an angle to each other. Since the cross-sections of the two channels are the same, the extruded product can be re-inserted into the entrance channel and pushed again through the die. Repeated extrusion through the ECAE/P die accumulates sufficient strain to breakdown the microstructure and produce ultra fine grain size. It is well known that metals with very fine grain sizes (\leq 10- μ m) have higher strain rate sensitivity and greater elongation to failure at elevated temperature, exhibiting superplastic behavior. However, this superplastic behavior is usually manifest at high temperature (\geq half the melting temperature on the absolute scale) and very low strain rates (\leq 10⁻⁴ s⁻¹). UFG metals have been shown to exhibit superplastic characteristics at lower temperature and higher strain rates, making this phenomenon more practical for manufacturing. This enables part unitization and forging more complex and net shape parts. Laboratory studies have shown that this is particularly true for UFG metals produced by SPD techniques. This combination of properties makes UFG metals produced by SPD very attractive as machining, forging or extrusion stock, both from the point of view of formability as well as energy and cost saving. However, prior to this work there had been no attempt to transfer these potential benefits observed in the laboratory scale to industrial shop floor. The primary reason for this was that the laboratory scale studies had been conducted to develop a scientific understanding of the processes that result in grain refinement during SPD. Samples that had been prepared in the laboratory scale were typically only about 10-mm diameter and 50-mm long (about 0.5-inch diameter and 2-inches long). The thrust of this project was three-fold: (i) to show that the ECAE/P process can be scaled up to produce long samples, i.e., a continuous severe plastic deformation (CSPD) process, (ii) show the process can be scaled up to produce large cross section samples that could be used as forging stock, and (iii) use the large cross-section samples to produce industrial size forgings and demonstrate the potential energy and cost savings that can be realized if SPD processed stock is adopted by the forging industry.

NTIS

Aluminum Alloys; Microstructure; Plastic Deformation

20070002774 Lawrence Livermore National Lab., Livermore, CA USA

Phase Stability in Heavy f-Electron Metals from First-Principles Theory

Soderlind, P.; Nov. 29, 2005; 18 pp.; In English

Report No.(s): DE2006-888596; UCRL-CONF-217360; No Copyright; Avail.: National Technical Information Service (NTIS)

The structural phase stability of heavy f-electron metals is studied by means of density-functional theory (DFT). These include temperature-induced transitions in plutonium metal as well as pressure-induced transitions in the trans-plutonium metals Am, Cm, Bk, and Cf. The early actinides (Th-Np) display phases that could be rather well understood from the competition of a crystal-symmetry breaking mechanism (Peierls distortion) of the 5f states and electrostatic forces, while for the trans-plutonium metals (Am-Cf) the ground-state structures are governed by 6d bonding. We show in this paper that new physics is needed to understand the phases of the actinides in the volume range of about 15-30 (angstrom)(sup 3). At these volumes one would expect, from theoretical arguments made in the past, to encounter highly complex crystal phases due to a Peierls distortion. Here we argue that the symmetry reduction associated with spin polarization can make higher symmetry phases competitive. Taking this into account, DFT is shown to describe the well-known phase diagram of plutonium and also the recently discovered complex and intriguing high-pressure phase diagrams of Am and Cm. The theory is further applied to investigate the behaviors of Bk and Cf under compression.

NTIS

Actinide Series; Heavy Metals; Structural Stability

20070002813 NASA Marshall Space Flight Center, Huntsville, AL, USA

Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying

Sen, S.; ODell, S.; Gorti, S.; Litchford, R.; [2006]; 1 pp.; In English; International Conference on Solidification Science and Processing (ICSSP3), 20-23 Nov. 2006, Jaipur, India

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

The vacuum plasma spraying (VPS) technique was employed to produce dense and net shaped components of a new tungsten-rhenium (W-Re) refractory metal alloy. The fine grain size obtained using this technique enhanced the mechanical properties of the alloy at elevated temperatures. The alloy development also included incorporation of thermodynamically stable dispersion phases to pin down grain boundaries at elevated temperatures and thereby circumventing the inherent problem of recrystallization of refractory alloys at elevated temperatures. Requirements for such alloys as related to high temperature space propulsion components will be discussed. Grain size distribution as a function of cooling rate and dispersion phase loading will be presented. Mechanical testing and grain growth results as a function of temperature will also be discussed.

Author

Fabrication; Refractory Metal Alloys; Vacuum; Plasma Spraying

20070002852 International Trade Commission, Washington, DC USA

Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review)

Apr. 2005; 269 pp.; In English

Report No.(s): PB2007-101232; USITC/PUB-3767; No Copyright; Avail.: CASI: [A12](#), Hardcopy

On the basis of the record developed in the subject five-year reviews, the USA International Trade Commission (Commission) determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. section 1675(c)) (the Act), that revocation of the antidumping duty and countervailing duty orders on certain hot-rolled flat-rolled carbon-quality steel products from Brazil and Japan, and termination of the suspended antidumping duty investigation on imports of certain hot-rolled flat-rolled carbon-quality steel products from Russia, would be likely to lead to continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.

NTIS

Brazil; Carbon Steels; International Trade; Japan; Russian Federation

20070002857 International Trade Commission, Washington, DC USA

Certain Aluminum Plate from South Africa. Investigation No. 731-TA-1056 (Final)

Nov. 2004; 158 pp.; In English

Report No.(s): PB2007-101217; USITC/PUB-3734; No Copyright; Avail.: CASI: [A08](#), Hardcopy

On the basis of the record developed in the subject investigation, the USA International Trade Commission (Commission) determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. section 1673d(b)) (the Act), that an industry in the USA is not materially injured or threatened with material injury, and the establishment of an industry in the USA is not materially retarded, by reason of imports from South Africa of certain aluminum plate, provided for in subheading 7606.12.30 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce (Commerce) to be sold in the USA at less than fair value (LTFV).

NTIS

Aluminum; Republic of South Africa

20070002861 International Trade Commission, Washington, DC USA

Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary)

Apr. 2004; 121 pp.; In English

Report No.(s): PB2007-101204; USITC/PUB-3687; No Copyright; Avail.: CASI: [A06](#), Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission (Commission) determines, pursuant to section 733(a) of the Tariff Act of 1930 (19 U.S.C. section 1673b(a)) (the Act), that there is a reasonable indication that an industry in the USA is materially injured by reason of imports from China, Korea, and Mexico of certain welded carbon quality line pipe provided for in subheadings 7306.10.10 and 7306.10.50 of the Harmonized Tariff Schedule of the USA at less than fair value (LFTV).

NTIS

Carbon; Carbon Steels; China; International Trade; Korea; Pipes (Tubes)

20070002885 Northwestern Univ., Evanston, IL, USA

Alloy Design of Nanoscale Precipitation Strengthened Alloys: Design of a Heat Treatable Aluminum Alloy Useful to 400 Degrees Celsius. Final Report

Fine, M. E.; May 06, 2006; 38 pp.; In English

Report No.(s): DE2006-882496; No Copyright; Avail.: National Technical Information Service (NTIS)

A creep resistant high temperature Al base alloy made by conventional processing procedures is the subject of this research. The Ni-based superalloys have volume fractions of cubic L1(sub 2) phase precipitates near 50%. This is not attainable with Al base alloys and the approach pursued in this research was to add L1(sub 2) structured precipitates to the Al-Ni eutectic alloy, 2.7 at. % Ni - 97.3 at. % Al. The eutectic reaction gives platelets of Al(sub 3)Ni (DO(sub 11) structure) in an almost pure Al matrix. The Al(sub 3)Ni platelets give reinforcement strengthening while the L1(sub 2) precipitates strengthen the Al alloy matrix. Based on prior research and the extensive research reported here modified cubic L1(sub 2) Al(sub 3)Zr is a candidate. While cubic Al(sub 3)Zr is metastable, the stable phase is tetragonal, only cubic precipitates were observed after 1600 hrs at 425 degrees C and they hardly coarsened at all with time at this temperature. Also addition of Ti retards the cubic to tetragonal transformation; however, a thermodynamically stable precipitate is desired. A very thorough ab initio computational investigation was done on the stability of L1(sub 2) phases of composition, (Al,X)(sub 3)(Zr,Ti) and the possible occurrence of tie lines between a stable L1(sub 2) phase and the Al alloy terminal solid solution. Precipitation of cubic (Al(sub (1-x))Zn(sub x))(sub 3)Zr in Al was predicted by these computations and subsequently observed by experiment (TEM).

NTIS

Aluminum Alloys; Heat Resistant Alloys; Precipitation Hardening

20070002988 NASA Glenn Research Center, Cleveland, OH, USA

Metallic Seal Development for Advanced Docking/Berthing System

Oswald, Jay; Daniels, Christopher; Dunlap, Patrick, Jr.; Steinetz, Bruce; 2005 NASA Seal/Secondary Air System Workshop, Volume 1; October 2006, pp. 507-523; In English; See also 20070002977; Original contains color illustrations; Copyright; Avail.: CASI: [A03](#), Hardcopy

Feasibility of metal-to-metal androgenous seals has been demonstrated. Techniques to minimize surface irregularities must be examined. Two concepts investigated: 1) Flexible metal interface with elastomeric preloader; 2) Flexibility will accommodate any surface irregularities from the mating surface. Rigid metal interface with elastomeric preloader. Rigidity of the metal surface will prevent irregularities (waves) from occurring.

Derived from text

Metal Surfaces; Spacecraft Docking; Surface Defects; Elastomers; Sealers; Bonding

20070003034 Ecole Nationale Supérieure des Mines, Sainte-Etienne, France

Hot Working of High-Purity Nickel-Niobium Alloys (Preprint)

Montheillet, F; Girard, S; Desrayaud, Ch; Le Coze, J; Semiatin, S L; Apr 2006; 9 pp.; In English

Contract(s)/Grant(s): FA8655-03-M-4061

Report No.(s): AD-A458861; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458861>; Avail.: CASI: [A02](#),

Hardcopy

The present work deals with the influence of niobium in solid solution on the dynamic recrystallization of pure nickel. High-purity nickel and two model nickel-niobium alloys were deformed to large strains via torsion at temperatures between 800 and 1000-C. Niobium additions considerably increased the flow stress, while they lowered the strain-rate sensitivity and increased the apparent activation energy. EBSD of the steady-state microstructures revealed strong grain refinement. Substructure development was favored, whereas thermal twinning was reduced by niobium. More generally, discontinuous recrystallization kinetics were considerably decreased.

DTIC

Hot Working; Nickel Alloys; Niobium Alloys; Purity

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*.

20070002107 International Trade Commission, Washington, DC USA

Certain Colored Synthetic Organic Oleoresinous Pigment Dispersions from India. Investigation Nos. 701-TA-436 (Preliminary) and 731-TA-1042 (Preliminary)

Jul. 2003; 71 pp.; In English

Report No.(s): PB2007-101172; USITC/PUB-3615; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Based on the record in these investigations, the Commission determined that there is no reasonable indication that an industry in the USA is materially injured or threatened with material injury by reason of imports of colored synthetic organic oleoresinous pigment dispersions from India that are alleged to be subsidized by the Government of India and alleged to be sold in the United States at less than fair value (LTFV)

NTIS

Color; India; Pigments

20070002130 International Trade Commission, Washington, DC USA

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary)

May 2004; 81 pp.; In English

Report No.(s): PB2007-101178; USITC/PUB-3694; No Copyright; Avail.: CASI: [A05](#), Hardcopy

Based on the record in these investigations, the Commission finds that there is a reasonable indication that an industry in the United States is materially injured by reason of imports of bottle-grade polyethylene terephthalate resin (PET resin) from India and Thailand that are allegedly to be sold in the USA at less than fair value (LTFV). PET is a large-volume commodity plastic resin commonly used to produce bottles and other containers. Bottle-grade PET resin producers sell the product to downstream converters who fabricate the resin into products for end-use applications such as containers for soft drinks, water, juices, peanut butter, jams and jellies.

NTIS

India; Indonesia; Polyethylene Terephthalate; Polyethylenes; Resins; Taiwan; Thailand

20070002576 California Univ., Davis, CA, USA

Preparation of Nanocomposites of Alumina and Titania

Wan, J.; Mukherjee, A. K.; 2 Aug 04; 4 pp.; In English

Contract(s)/Grant(s): ONR-N00014-01-C-0370

Patent Info.: Filed 2 Aug 04; US-Patent-Appl-SN-10-910-556

Report No.(s): PB2007-103793; No Copyright; Avail.: CASI: [A01](#), Hardcopy

High-density composites of alumina and titania with nano-sized grains are prepared from aluminum titanate without the

need to use nano-sized powder as a starting material. The preparation is achieved by high-energy ball milling of the aluminum titanate followed by sintering at elevated temperature and pressure. The aluminum titanate can be prepared from micron-sized alumina and titania particles through plasma jet processing.

NTIS

Aluminum Oxides; Nanocomposites; Patent Applications; Titania

20070002581 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Crystal Photonics, Inc., Oviedo, FL, USA

Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO

Jasinski, J.; Liliental-Weber, Z.; Maruska, H. P.; Chai, B. H.; Hill, D. W.; January 2006; 6 pp.; In English

Report No.(s): DE2006-861962; No Copyright; Avail.: Department of Energy Information Bridge

(1010) GaN wafers grown on (100) face of gamma-LiAlO₂ were studied using transmission electron microscopy. Despite good lattice matching in this heteroepitaxial system, high densities of planar structural defects in the form of stacking faults on the basal plane and networks of boundaries located on prism planes inclined to the layer/substrate interface were present in these GaN layers. In addition, significant numbers of threading dislocations were observed. High-resolution electron microscopy indicates that stacking faults present on the basal plane in these layers are of low-energy intrinsic I1 type. This is consistent with diffraction contrast experiments.

NTIS

Gallium Nitrides; Wafers

20070002707 NASA Glenn Research Center, Cleveland, OH, USA

MISSE PEACE Polymers Atomic Oxygen Erosion Results

deGroh, Kim, K.; Banks, Bruce A.; McCarthy, Catherine E.; Rucker, Rochelle N.; Roberts, Lily M.; Berger, Lauren A.; November 2006; 25 pp.; In English; 2006 MISSE Post-Retrieval Conference, 26-30 Jun. 2006, Orlando, FL, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 671.01.03.36

Report No.(s): NASA/TM-2006-214482; E-15774; Copyright; Avail.: CASI: [A03](#), Hardcopy

Forty-one different polymer samples, collectively called the Polymer Erosion and Contamination Experiment (PEACE) Polymers, have been exposed to the low Earth orbit (LEO) environment on the exterior of the International Space Station (ISS) for nearly 4 years as part of Materials International Space Station Experiment 2 (MISSE 2). The objective of the PEACE Polymers experiment was to determine the atomic oxygen erosion yield of a wide variety of polymeric materials after long term exposure to the space environment. The polymers range from those commonly used for spacecraft applications, such as Teflon (DuPont) FEP, to more recently developed polymers, such as high temperature polyimide PMR (polymerization of monomer reactants). Additional polymers were included to explore erosion yield dependence upon chemical composition. The MISSE PEACE Polymers experiment was flown in MISSE Passive Experiment Carrier 2 (PEC 2), tray 1, on the exterior of the ISS Quest Airlock and was exposed to atomic oxygen along with solar and charged particle radiation. MISSE 2 was successfully retrieved during a space walk on July 30, 2005, during Discovery's STS-114 Return to Flight mission. Details on the specific polymers flown, flight sample fabrication, pre-flight and post-flight characterization techniques, and atomic oxygen fluence calculations are discussed along with a summary of the atomic oxygen erosion yield results. The MISSE 2 PEACE Polymers experiment is unique because it has the widest variety of polymers flown in LEO for a long duration and provides extremely valuable erosion yield data for spacecraft design purposes.

Author

Erosion; Polymerization; Charged Particles; High Temperature; Oxygen Atoms; Polyimides; Earth Orbital Environments

20070002742 Lawrence Livermore National Lab., Livermore, CA USA

Shape Memory Polymer Therapeutic Devices for Stroke

Wilson, T. S.; Mall, W.; Bennett, W. J.; Beringer, J. P.; Maitland, D. J.; Oct. 11, 2005; 14 pp.; In English

Report No.(s): DE2006-885377; UCRL-PROC-216091; No Copyright; Avail.: Department of Energy Information Bridge

Shape memory polymers (SMPs) are attracting a great deal of interest in the scientific community for their use in applications ranging from light weight structures in space to micro-actuators in MEMS devices. These relatively new materials can be formed into a primary shape, reformed into a stable secondary shape, and then controllably actuated to recover their primary shape. The first part of this presentation will be a brief review of the types of polymeric structures which give rise to shape memory behavior in the context of new shape memory polymers with highly regular network structures recently

developed at LLNL for biomedical devices. These new urethane SMPs have improved optical and physical properties relative to commercial SMPs, including improved clarity, high actuation force, and sharper actuation transition. In the second part of the presentation we discuss the development of SMP based devices for mechanically removing neurovascular occlusions which result in ischemic stroke. These devices are delivered to the site of the occlusion in compressed form, are pushed through the occlusion, actuated (usually optically) to take on an expanded conformation, and then used to dislodge and grip the thrombus while it is withdrawn through the catheter.

NTIS

Computer Storage Devices; Shapes; Therapy

20070002766 Myers Bigel Sibley and Sajovec, Raleigh, NC, USA

Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces

Lindsey, J. S.; Loewe, R. S.; Muthukumaran, K.; Ambrose, A.; 31 Oct 03; 29 pp.; In English

Contract(s)/Grant(s): DARPA-MDA972-01-C-0072

Patent Info.: Filed Filed 31 Oct 03; US-Patent-Appl-SN-10-698-255

Report No.(s): PB2007-100867; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A method of making a phosphono-substituted dipyrromethane comprises reacting an aldehyde or acetal having at least one phosphono group substituted thereon with pyrrol to produce a phosphono-substituted dipyrromethane; and wherein the phosphono is selected from the group consisting of dialkyl phosphono, diaryl phosphono, and dialkylaryl phosphono. Additional methods, intermediates and products are also described.

NTIS

Metal Oxides; Patent Applications; Porphyrins; Acetals

20070002785 Halliburton Services, Duncan, OK, USA, CalEnergy Operating Corp., Calipatria, CA, USA

Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement

Sugama, T.; Brothers, L. E.; Van de Putte, T. R.; Jun. 2005; 24 pp.; In English

Report No.(s): DE2006-885883; BNL-75395-2006-IR; No Copyright; Avail.: Department of Energy Information Bridge

We evaluated the usefulness of manufactured quartz/mullite blend (MQMB) ceramic powder in increasing the resistance to acid of sodium silicate-activated slag (SSAS) cementitious material for geothermal wells. A 15-day exposure to 90 deg CO₂-laden H₂SO₄ revealed that the MQMB had high potential as an acid-resistant additive for SSAS cement. Two factors, the appropriate ratio of slag/MQMB and the autoclave temperature, contributed to better performance of MQMB-modified SSAS cement in abating its acid erosion. The most effective slag/MQMB ratio in minimizing the loss in weight by acid erosion was 70/30 by weight. For autoclave temperature, the loss in weight of 100 deg C autoclaved cement was a less than 2 %, but at 300DG C it was even lower. Before exposure to acid, the cement autoclaved at 100DG C was essentially amorphous; increasing the temperature to 200DG C led to the formation of crystalline analcime in the zeolitic mineral family during reactions between the mullite in MQMB and the Na from sodium silicate. In addition, at 300DGC, crystal of calcium silicate hydrate (1) (CSH) was generated in reactions between the quartz in MQMB and the activated slag. These two crystalline phases (CSH and analcime) were responsible for densifying the autoclaved cement, conveying improved compressive strength and minimizing water permeability. The CSH was susceptible to reactions with H₂SO₄, forming two corrosion products, bassanite and ionized monosilicic acid. However, the uptake of ionized monosilicic acid by Mg dissociated from the activated slag resulted in the formation of lizardite as magnesium silicate hydrate. On the other hand, the analcime was barely susceptible to acid if at all. Thus, the excellent acid resistance of MQMB-modified SSAS cement was due to the combined phases of lizardite and analcime.

NTIS

Cements; Ceramics; Mixtures; Mullites; Quartz; Slags; Sodium Silicates; Wells

20070002793 Gas Technology Inst., Des Plaines, IL, USA

Development of Permanent Mechanical Repair Sleeve for Plastic Pipe

January 2006; 54 pp.; In English

Report No.(s): DE2006-885432; No Copyright; Avail.: National Technical Information Service (NTIS)

A comprehensive program was undertaken to design and develop a mechanical repair fitting that can be installed under live blowing gas conditions to serve as a permanent repair option. Through an iterative design and development approach, GTI and R. W. Lyall have developed a viable product design concept. From the onset, the project identified and took into account

three key technical challenges throughout the entire design and development process. First, the fitting must be capable of being installed under live blowing gas conditions thereby eliminating the need for additional excavations and parts leading to reduced cost of repair. Second, once installed, the fitting must amply mitigate the continued growth of the damage through the Slow Crack Growth (SCG) failure mechanism. Finally, the fitting must serve as a permanent repair by providing a leak tight seal at typical operating pressures over its intended design life.

NTIS

Pipes (Tubes); Sleeves

20070002854 International Trade Commission, Washington, DC USA

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final)

May 2005; 182 pp.; In English

Report No.(s): PB2007-101224; USITC/PUB-3769; No Copyright; Avail.: CASI: [A09](#), Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission (Commission) determines, pursuant to section 705(b) of the Tariff Act of 1930 (19 U.S.C. section 1671d(b)) (the Act), that an industry in the USA is not materially injured or threatened with material injury, and the establishment of an industry in the USA is not materially retarded, by reason of imports from India of PET resin, provided for in subheading 3907.60.00 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce (Commerce) to be subsidized by the Government of India. The Commission also determines, pursuant to section 735(b) of the Act (19 U.S.C. section 1673d(b)), that an industry in the USA is not materially injured or threatened with material injury, and the establishment of an industry in the USA is not materially retarded, by reason of imports from India, Indonesia, and Thailand of PET resin that have been found by Commerce to be sold in the USA at less than fair value (LTFV).

NTIS

India; Indonesia; Polyethylene Terephthalate; Resins; Thailand

20070003027 Academy of Sciences of the Ukraine, Frantzevich, Ukraine

Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II)

Kartuzov, Valeriy V; Nov 30, 2006; 65 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N62558-05-P-0488

Report No.(s): AD-A458850; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458850>; Avail.: CASI: [A04](#), Hardcopy

Penetration of non-deformable projectiles in continuum with various rheological properties has been of interest to researchers for a long time. The first modeling representations of penetration were formulated in XVIII-XIX centuries in Euler's, Poncelet's, Wuich's works, etc. Analysis of these results can be found in A.J. Sagomonjan's monographs. In conjunction with development of more exact and effective technical means in the last two decades, the interest in this problem has considerably increased, and this is proved by works of Voejkova and Sagomonjan (1985), Alojan (1985), Liapykhin et al. (1993), Bahrah et al. (1992), Forrestal et al. (1988), (1992), (2000), Dikshit and Sundararajan (1992), Piekutowski et al. (1999), Warren and Forrestal (1998), Warren (2000), Yossifon et al. (2001), Chen and Li (2002). The analysis of the modern state of the problem of analytical modeling of high-velocity penetration of non-deformable projectiles in targets can be found in works by Forrestal et al., Warren and Forrestal, Yarin et al., Yossifon, Chen and Li. From this analysis, it follows that at present there is a deficiency of relatively simple analytical models using natural, physical, and geometrical parameters of projectiles and targets and with a small number of fitting parameters. In this study, we have built and investigated a new model of penetration of non-deformable projectiles of various shapes in elastic-plastic and elastic-brittle materials.

DTIC

Ceramics; Computerized Simulation; Deformation; Mathematical Models; Penetration; Projectiles

20070003092 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant

Boglarski, Stephen L; Jan 2006; 95 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458939; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458939>; Avail.: CASI: [A05](#), Hardcopy

Solid phase microextraction (SPME) is used to conduct analyses for trace levels of nerve agent. Measurements can be improved by using a SPME polymer coating that is selective for nerve agents in place of current commercial polymers. This research focuses on three hydrogen bond acidic polymers developed by the Naval Research Laboratory that have an increased affinity for nerve agents. These polymers were coated onto fused silica fibers using three methods: dip coating, applicator coating, and ink jet coating. Vapor and aqueous phase sampling of nerve agent simulant was conducted to evaluate the performance of these polymers. The hydrogen bond acidic polymers showed significantly higher uptakes than commercial polymers and were able to detect vapor phase nerve agent simulant at 0.005 mg/m³ for a 1 minute sample and aqueous phase simulant at 1 ppm for a 10 minute sample. The use of these polymers with SPME extraction has the potential to provide rapid field sampling for the detection of trace levels of nerve agent.

DTIC

Acidity; Hydrogen Bonds; Nerves; Polycarbosilanes; Solid Phases

20070003133 California Univ., Santa Cruz, CA USA

Thermoelectric Power Factor for Electrically Conductive Polymers

Shakouri, Ali; Li, Suqun; Sep 1999; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459010; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459010>; Avail.: CASI: A02,

Hardcopy

In conventional semiconductors increasing the doping will reduce the Seebeck coefficient and there is an optimum doping concentration for thermoelectric cooling or power generation applications. An overview of the experimental results for the power factor (electrical conductivity times the square of Seebeck coefficient) for various electrically conductive polymers is presented. Even though the Seebeck coefficient decreases with doping the power factor keeps increasing. Various mechanisms of electron transport in polymers are described and the doping dependence of the power factor is analyzed.

DTIC

Additives; Electrical Resistivity; Thermoelectric Cooling; Thermoelectric Power Generation; Thermoelectricity

20070003134 Massachusetts Inst. of Tech., Cambridge, MA USA

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint)

Kopesky, Edward T; Haddad, Timothy S; McKinley, Gareth H; Cohen, Robert E; Apr 22, 2005; 11 pp.; In English

Contract(s)/Grant(s): F49620-01-1-0447; Proj-2303

Report No.(s): AD-A459011; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459011>; Avail.: CASI: A03,

Hardcopy

Blends of poly(methyl methacrylate) (PMMA) with two acrylic polyhedral oligomeric silsesquioxanes (POSS) were analyzed to determine the effect of well-dispersed POSS nanoparticles on the thermo-mechanical properties of PMMA. Differential scanning calorimetry (DSC), dynamic mechanical analysis (DMA), and melt rheology all showed that the dispersed POSS behaved like a plasticizer. Differential scanning calorimetry (DSC) showed a larger drop in the glass transition temperature T_g in the blends containing unmodified acrylic-POSS when compared with hydrogenated acrylic-POSS blends at the same loading. This difference in the degree of T_g plasticization was directly related to the degree of miscibility of the POSS and PMMA.

DTIC

Acrylates; Acrylic Resins; Mixtures; Oligomers; Siloxanes; Solubility; Viscoelasticity

20070003166 North Carolina State Univ., Raleigh, NC USA

A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers

Banks, H T; Hood, J B; Medhin, N G; Samuels, Jr, J R; Nov 19, 2006; 37 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0220

Report No.(s): AD-A459065; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459065>; Avail.: CASI: A03,

Hardcopy

A Rouse model for polymer chains is incorporated into the linear continuous stick-slip molecular-based tube reptation ideas of Doi-Edwards and Johnson-Stacer. This treats the physically constrained (PC) molecular stretches as internal strain variables for the overall PC/chemically cross-linked (CC) system. It yields an explicit system of stress-strain equations for the system permitting simple calculations of complex stress-strain relations. The model that is developed here treats PC molecule

as entrapped within a constraining tube, which is comprised of both CC and PC molecules. The model is compared with experimental data sets from the literature.

DTIC

Hysteresis; Molecular Chains; Polymers; Viscoelasticity

20070003258 Army Research Lab., Aberdeen Proving Ground, MD USA

Special Workshop: Kolsky/Split Hopkinson Pressure Bar Testing of Ceramics

McCauley, James W; Quinn, George D; Sep 2006; 70 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): ARL-SR-144

Report No.(s): AD-A459248; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459248>; Avail.: CASI: [A04](#),

Hardcopy

A special workshop on Kolsky Bar/Split Hopkinson Pressure Bar Testing of Armor Ceramics was held in conjunction with the 29th International Conference and Exposition on Advanced Ceramics and Composites, Cocoa Beach, FL, on 27 January 2005. This special report is a collection of the pertinent information from that workshop.

DTIC

Armor; Ceramics

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*.

20070002633 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies

Fikes, John C.; Howell, Joe T.; Henley, Mark; [2006]; 25 pp.; In English; 57th International Astronautical Congress, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations

Report No.(s): IAC-06-D3.3.08; Copyright; Avail.: CASI: [A03](#), Hardcopy

The objectives of the ISCPD Architecture Definitions and Systems Studies were to determine high leverage propellant depot architecture concepts, system configuration trades, and related technologies to enable more ambitious and affordable human and robotic exploration of the Earth Neighborhood and beyond. This activity identified architectures and concepts that preposition and store propellants in space for exploration and commercial space activities, consistent with Exploration Systems Research and Technology (ESR&T) objectives. Commonalities across mission scenarios for these architecture definitions, depot concepts, technologies, and operations were identified that also best satisfy the Vision of Space Exploration. Trade studies were conducted, technology development needs identified and assessments performed to drive out the roadmap for obtaining an in-space cryogenic propellant depot capability. The Boeing Company supported the NASA Marshall Space Flight Center (MSFC) by conducting this Depot System Architecture Development Study. The primary objectives of this depot architecture study were: (1) determine high leverage propellant depot concepts and related technologies; (2) identify commonalities across mission scenarios of depot concepts, technologies, and operations; (3) determine the best depot concepts and key technology requirements and (4) identify technology development needs including definition of ground and space test article requirements.

Author

Systems Engineering; Cryogenic Rocket Propellants; Upper Stage Rocket Engines; Launch Vehicle Configurations; NASA Programs; Astronautics

20070002669 NASA Marshall Space Flight Center, Huntsville, AL, USA

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems

Bragg-Sitton, Shannon M.; Dickens, Ricky E.; [2006]; 28 pp.; In English; American Nuclear Society Winter Meeting and Technology Expo, 12-16 Nov. 2006, Albuquerque, NM, USA; Original contains black and white illustrations; Copyright;

Avail.: CASI: [A03](#), Hardcopy

Non-nuclear testing can be a valuable tool in the development of a space nuclear power system. At the NASA MSFC Early Flight Fission Test Facility (EFF-TF), highly designed electric heaters are used to simulate the heat from nuclear fuel to test space fission power and propulsion systems. To allow early utilization, nuclear system designs must be relatively simple, easy

to fabricate, and easy to test using non-nuclear heaters to closely mimic heat from fission. In this test strategy, highly designed electric heaters are used to simulate the heat from nuclear fuel, allowing one to develop a significant understanding of individual components and integrated system operation without the cost, time and safety concerns associated with nuclear testing.

Author

Aerospace Systems; Fabrication; Fission; Test Facilities; Heaters; Thermal Simulation

20070002670 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications

Howell, Joe T.; Fikes, John C.; Henley, Mark W.; [2006]; 31 pp.; In English; 2006 Japan-US Science, Technology and Space Applications Program (JUSTSAP), 12-16 Nov. 2006, Kohala Coast, HI, USA; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002670>; Avail.: CASI: A03, Hardcopy

The key goals and objectives for an In-Space Cryogenic Propellant Depot are to support a safe, reliable, affordable and effective future human and robotic space exploration initiative. Previous studies have been conducted at the NASA Marshall Space Flight Center to determine technical requirements and feasibility for exploration and commercial potential of an in-space cryogenic propellant depot in low-Earth-orbit (LEO), low-Lunar orbit (LLO) and/or on the lunar surface. Results indicate that in-space cryogenic propellant depots are technically feasible given continued technology development and that there is a substantial growing market that depots could support. Systems studies showed that the most expensive part of transferring payloads to geo-synchronous-orbit (GEO) is the fuel. A cryogenic propellant production and storage depot stationed in LEO could lower the cost of missions to GEO and beyond. Propellant production separates water into hydrogen and oxygen through electrolysis. This process requires large amounts of power which is enabled by Space Solar Power technologies. Recent analysis indicate that in the coming decades there could be a significant demand for water-based propellants from Earth, moon, or asteroid resources if in-space transfer vehicles (upper stages) transitioned to reusable systems using water based propellants. This type of strategic planning move could create a substantial commercial market for space resources development, and ultimately lead toward significant commercial infrastructure development within the Earth-Moon system.

Author

Cryogenic Rocket Propellants; Cryogenic Fluid Storage; Aerospace Engineering; Space Exploration; Commercialization

20070002672 NASA Marshall Space Flight Center, Huntsville, AL, USA

Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility

Kegley, Jeffrey; Baker, Mark; Carpenter, Jay; Eng, Ron; Haight, Harlan; Hogue, William; McCracken, Jeff; Siler, Richard; Wright, Ernie; [2006]; 1 pp.; In English; 24th Space Simulation Conference, 6-9 Nov. 2006, Annapolis, MD, USA; No Copyright; Avail.: Other Sources; Abstract Only

Marshall Space Flight Center's X-ray & Cryogenic Test Facility (XRCF) has been performing sub-liquid nitrogen temperature testing since 1999. Optical wavefront measurement, thermal structural deformation, mechanism functional & calibration, and simple cryo-conditioning tests have been completed. Recent modifications have been made to the facility in support of the James Webb Space Telescope (JWST) program. The chamber's payload envelope and the facility's refrigeration capacity have both been increased. Modifications have also been made to the optical instrumentation area improving access for both the installation and operation of optical instrumentation outside the vacuum chamber. The facility's capabilities, configuration, and performance data will be presented.

Author

Cryogenics; Test Facilities; X Rays; Temperature Measurement

20070003237 Army Tank-Automotive Research and Development Command, Warren, MI USA

Hybrid Drive Partnerships Keep the Army on the Right Road

DiSante, Peter G; Paschen, Jana; May 7, 2003; 4 pp.; In English
Report No.(s): AD-A459205; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459205>; Avail.: CASI: A01, Hardcopy

The drive to security, as well as prosperity, follows the same road. The trucking industry has a vested interest in the alternative propulsion needs of military vehicles. Just as important, the military vehicle community is synchronized with the trucking industry. Only through cooperation can the Army reasonably obtain the drive technology it requires to be successful. By providing that cooperation, commercial interests can develop the technology to meet military requirements while

advancing the trucking industry as well. The mission of the National Automotive Center (NAC), part of the Tank Automotive Research, Development and Engineering Center (TARDEC), located in Warren, MI, is to serve as a catalyst linking industry, academia, and government agendas in the development and exchange of automotive technologies. One focus of the NAC has been to find ways to get more useful work for every gallon of fuel burned. One way is to allow the engine to run as close to its peak operating point as possible, while storing unused, or previously 'wasted' energy, to be used for providing the drive during transient stages. This combination of engine power and energy storage is the hybrid concept.

DTIC

Automobile Fuels; Roads

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*.

20070002620 NASA Marshall Space Flight Center, Huntsville, AL, USA

Industrial and Systems Engineering Applications in NASA

Shivers, Charles H.; [2006]; 38 pp.; In English; First International Congress of Industrial and Systems Engineers, 21-23 Sep. 2006, Michoacan, Mexico; Original contains black and white illustrations; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002620>; Avail.: CASI: A03, Hardcopy

A viewgraph presentation on the many applications of Industrial and Systems Engineering used for safe NASA missions is shown. The topics include: 1) NASA Information; 2) Industrial Engineering; 3) Systems Engineering; and 4) Major NASA Programs.

CASI

NASA Programs; Systems Engineering; Industrial Management; Space Missions; Launch Vehicles

20070002673 National Taiwan Univ. of Science and Technology, Taipei, Taiwan, Province of China

Journal of The Chinese Institute of Engineers, Volume 29, No. 5

Pan, Ching Tsai, Editor; September 2006; ISSN 0253-3939; 179 pp.; In English; See also 20070002674 - 20070002690; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The following topics were covered: Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan; Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells; An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold; A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers; Delay-Dependent H(sub infinity) Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach; Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled; Induction Motor Drive Based on Stability Consideration; Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number; Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness; Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates; Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor; MFXRLS-Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems; Electromechanical Responses of Optical Fibers with Piezoelectric Coatings; Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder; An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design; Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding; and Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm. Robust Mixed H2IH(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI

Derived from text

Adaptive Control; Electromagnetic Pulses; Electromechanics; Field-Programmable Gate Arrays; Structural Vibration; Thermodynamics; Reynolds Number; Piezoelectricity; Genetic Algorithms

20070002674 Korea Univ., Korea, Republic of

An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold

Ahn, Sang--Sik; Lee, Yoon-Chang; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 783-789; In English; See also 20070002673; Copyright; Avail.: Other Sources

A voice activity detection (VAD) algorithm with a fixed threshold cannot follow fluctuations of signal and noise power level in a time-varying environment and the inability to adapt to a time-varying environment severely limits the VAD performance. Therefore, we need to employ an adaptive threshold with which the VAD will have enhanced performance even in a time-varying SNR environment. In this paper, we propose an improved statistical model-based VAD algorithm employing preprocessing and an adaptive threshold. We also perform extensive computer simulations to demonstrate performance improvement of the proposed algorithm under various noise environments, when compared to other algorithms.

Author

Algorithms; Noise Intensity; Computerized Simulation; Detection

20070002677 National Taiwan Univ. of Science and Technology, Taipei, Taiwan, Province of China

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration

Hu, Chien-Feng; Liu, Chang-Huan; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 813-825; In English; See also 20070002673; Copyright; Avail.: Other Sources

The purpose of this paper is to determine the controller parameter tuning range for a speed sensorless vector-controlled induction motor drive from the system stability point of view. The tuning rules for conventional PI controllers are mostly based on experience. Trial-and-error procedures are used to tune the values of the controller parameters. The relationship between the tuned controller parameters and the stable operating range of the control system is generally not known. This paper starts from establishing complete dynamic models for a sensorless vector-controlled induction motor drive. The nonlinear dynamic models are linearized around a chosen operating point. The characteristic equation is then derived, which is used to determine the values of the controller parameters corresponding to the marginal system stability. Based on these critical values, the tuning ranges of the controller parameters are obtained, which assures stable operation of the drive in the entire operating region and provides a reference for controller parameter tuning. The proposed method is further extended to include the effect of parameter sensitivity due to motor parameter variation. An experimental setup based on a DSP-FPGA system is implemented. The simulation and experiments confirm the validity of the proposed approach.

Author

Field-Programmable Gate Arrays; Controllers; Trajectory Control; Dynamic Models; Errors; Induction Motors; Eigenvectors

20070002678 National Chung Hsing Univ., Taichung, Taiwan, Province of China

MFRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems

Liao, Ching-Wen; Lin, Jong-Yih; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 883-891; In English; See also 20070002673

Contract(s)/Grant(s): NSC 91-2213-E-005-007; Copyright; Avail.: Other Sources

To improve performance of a dual voice coil (DVC) actuator speaker in an active noise control (ANC) system, a speaker model that includes coupling dynamics and source of noise pressure is first derived to design an adaptive feed-forward controller based on modified, filtered-X, recursive-least-squares (MFRLS) algorithm in this investigation. A novel velocity sensor measuring velocity of the speaker face is further developed by use of a frequency-response method. Two transfer functions required for the velocity sensor are identified in two steps: (i) the adaptive feed-forward controller is applied to keep speaker face velocity zero to identify the first transfer function; and (ii) the second transfer function is then obtained experimentally using the first transfer function. Performance of the established velocity sensor is similar to that of a Polytec OFV2100 laser velocity transducer. This velocity sensor is then incorporated with the adaptive feed-forward controller to control the DVC actuator speaker in the ANC system. For a sinusoidal command input of frequency below 390 Hz, the controlled speaker acquires a unit-gain magnitude and zero phase degree, showing that the controller can effectively reduce effects of the speaker dynamics, including coupling dynamics.

Author

Adaptive Control; Controllers; Noise Reduction; Acoustics; Algorithms; Frequency Response

20070002680 National Kaohsiung Univ. of Applied Sciences, Kaohsiung, Taiwan, Province of China

Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder

Li, Guan-Cyun; Yang, Sheng-An; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 903-908; In English; See also 20070002673

Contract(s)/Grant(s): NSC 94-2212-E-151-020; Copyright; Avail.: Other Sources

This paper aims to perform thermodynamic analysis of saturated vapor flowing slowly onto and condensing on an elliptical cylinder. This is the first approach to investigate how the geometric parameter-ellipticity and surface tension affect local entropy-generation rate during film-wise condensation heat transfer process. The results observe that entropy generation decreases with decreasing ellipticity. It indicates that the entropy generation number is nearly unaffected by surface tension forces at small ellipticity like e less than or equal to 0.7, but somewhat influenced at large ellipticity for the whole perimeter. From the second law point of view, local entropy generation increases with ellipticity as local heat transfer coefficient does. Furthermore, the entropy-generation rate due to gravity-driven film flow friction is proportional to Brinkman group parameter. The irreversibility ratio indicates that film flow friction irreversibility starts to dominate over heat transfer irreversibility in the lower half of streamwise length for higher values of Brinkman group parameter ($Br/THETA = 1$).

Author

Elliptical Cylinders; Film Condensation; Free Convection; Thermodynamics

20070002681 Ching Yun Univ., Chung-Li, Taiwan, Province of China

Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates

Huang, Chi-Hung; Hsu, Chien-Hsiang; Lin, Yen-Kuang; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 863-872; In English; See also 20070002673

Contract(s)/Grant(s): NSC 91-2212-E-231-002; Copyright; Avail.: Other Sources

Based on the advantages of non-contact and full field measurement, the optical technique called amplitude-fluctuation electronic speckle pattern interferometry (AFESPI) with an out-of-plane setup is employed to investigate the free vibration of cantilever trapezoidal plates with various taper ratios and sweep-back angles. Twenty different plate configurations are analyzed, including triangular and trapezoidal plates, and the first seven vibration modes of each plate are measured. The AF-ESP1 method is very convenient for measuring vibrating objects because no contact is required in contrast to classical modal analysis using accelerometers. Based on the fact that clear fringe patterns will appear only in resonance, both resonant frequencies and corresponding mode shapes can be obtained experimentally using the present technique. Numerical calculations by finite element method are also performed and the results are compared with the experimental measurements. Excellent agreements are obtained for both results of resonant frequencies and mode shapes. The influences of taper ratios and sweep-back angles on the vibration behavior of cantilever trapezoidal plates are also demonstrated in terms of the dimensionless frequency parameter.

Author

Cantilever Plates; Free Vibration; Numerical Analysis; Trapezoids; Thin Plates

20070002682 National Science Council, Taiwan, Province of China

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number

Wu, Shen-Chun; Tsai, Yuan-Sen; Chang, Yun-Ming; Chen, Yau-Ming; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 841-850; In English; See also 20070002673

Contract(s)/Grant(s): NSC 91-2212-E-014-013; Copyright; Avail.: Other Sources

The flow in an enclosed co-rotating disk pair is investigated by Laser Doppler Velocimetry (LDV) measurements and flow visualizations. First, the typical flow structure at $Re = 5.25 \times 10^5$ and $S = 0.09$ is clarified. The flow fields in the $r - \theta$ and the $r - z$ planes are both investigated and then divided into several flow regions based on the distinct flow types observed. The flow regions found in the two different planes are also compared and integrated. Second, with S fixed, the dependence of the flow field structure upon the Reynolds number is discussed. Three regimes of the $r - \theta$ plane flow with different Reynolds numbers are identified based on the measured mean velocity and spectral intensity. When $Re \leq 1.6 \times 10^5$, no solid body region is found and the flow is in a laminar regime. In the range $1.6 \times 10^5 < Re \leq 2.0 \times 10^6$, the solid body region and the outer region vortices coexist, and an empirical equation is developed to estimate the number of vortices. When $Re \geq 2.0 \times 10^6$, the flow becomes turbulent. As Re increases from 9.3×10^4 to 5.25×10^5 , the spectral intensity initially increases and then decreases before increasing again to an even higher level, resulting in an increasing sawtooth pattern.

Author

Rotation; Disks; Flow Distribution; Flow Visualization; Reynolds Number; Vortices; Laser Doppler Velocimeters

20070002683 I-Shou Univ., Kaohsiung, Taiwan, Province of China

Delay-Dependent $H(\infty)$ Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach

Lien, Chang-Hua; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 801-811; In English; See also 20070002673

Contract(s)/Grant(s): NSC-92-2213-E-214-042; Copyright; Avail.: Other Sources

In this paper, the delay-dependent $H(\infty)$, observer-based control for a class of uncertain neutral systems with time-varying delays is considered. The linear matrix inequality (LMI) optimization approach is used to design the $H(\infty)$, robust control with disturbance attenuation. The control and observer gains are given from the LMI feasible solutions. Some numerical examples are given to illustrate the use of the main result.

Author

Uncertain Systems; Inequalities; Variations

20070002684 Chung Chou Inst. of Technology, Changhua, Taiwan, Province of China

Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor

Yu, Wen-Chun; Wang, Gou-Jen; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 873-882; In English; See also 20070002673

Contract(s)/Grant(s): NSC 90-2212-E-005-009; Copyright; Avail.: Other Sources

A systematic and simple discrete sliding mode controller design scheme based on the suboptimal approach is presented. The behaviors of the control system can be determined through a preferred performance index. The AC servomotor position control is obtained using only the q-axis voltage control loop. The proposed method is simulated and experimented with to verify the capability of this new sliding mode control algorithm. Properties such as easy implementation, fast response, and robustness with relation to external loads are demonstrated.

Author

Controllers; Linear Quadratic Regulator; Servomotors; Sliding; Mathematical Models

20070002687 Wufeng Technology of Institute, Chiayi, Taiwan

A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers

Chen, Chia-Chong; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 791-799; In English; See also 20070002673

Contract(s)/Grant(s): NSC-95-2221-E-274-004; Copyright; Avail.: Other Sources

In this paper, a fuzzy min-max hyperbox classifier is designed to solve M-class classification problems using a hybrid SVM and supervised learning approach. In order to solve a classification problem, a set of training patterns is gathered from a considered classification problem. However, the training set may include several noisy patterns. In order to delete the noisy patterns from the training set, the support vector machine is applied to find the noisy patterns so that the remaining training patterns can describe the behavior of the considered classification system well. Subsequently, a supervised learning method is proposed to generate fuzzy min-max hyperboxes for the remaining training patterns so that the generated fuzzy min-max hyperbox classifier has good generalization performance. Finally, the Iris data set is considered to demonstrate the good performance of the proposed approach for solving this classification problem.

Author

Classifications; Classifiers; Iris Satellites

20070002688 National Taiwan Univ., Taipei, Taiwan, Province of China

Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness

Chang, Jeng-Shian; Chen, Hong-Chung; Lin, Han-Ting; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 851-862; In English; See also 20070002673; Copyright; Avail.: Other Sources

The elastic flexural behavior of static deformation and free vibration of sandwich plates of variable thickness is investigated numerically and experimentally. In the analysis, the face plates are treated as Marguerre shells, and the core is assumed to be an antiplane core and to provide resistance to transverse shear and normal stresses only. Displacement continuity conditions are used at the interfaces between face plates and the core to derive the displacement field. Energy formulations are obtained and solved by the isoparametric finite element method. The numerical results are obtained to compare with the results in the existing literature and to show the effects of taper constant and face plate thickness on

deflections and natural frequencies. Finally, experimental works based on the method of holographic interferometry are conducted to confirm the theoretical findings. Experimental and numerical data agree quite well in this work.

Author

Plates (Structural Members); Aluminum; Static Deformation; Free Vibration; Shear Stress; Metal Plates

20070002689 National Taiwan Univ., Taipei, Taiwan, Province of China

Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan

Lu, L. T.; Yu, Y. H.; Shang, N. C.; Yang, Y. M.; Ma, H. W.; Chen, L. J.; Hsiao, T. Y.; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 769-775; In English; See also 20070002673

Contract(s)/Grant(s): EPA-91-H103-02-241; Copyright; Avail.: Other Sources

This study applies the material flow analysis (MFA) of Cadmium to evaluate municipal solid waste (MSW) management policy in Taiwan. In 2002, the Cd flow in Taiwan was approximately 441.2 tons, mainly contributed by the Cd in nickel-cadmium batteries (60.15%) and plastics (33.45%). 415.6 tons of Cd entered the MSW treatment system from consumers. However, aside from the Cd emitted into the atmosphere (0.4 tons) and the Cd in incinerator ash (15.1 tons), the recycled Cd was 5.2 tons, representing a recycling rate of 1.2%. Moreover, instead of being effectively used, the recycled Cd is often casually deposited in the environment. Currently, Taiwan's Cd MFA data indicates that the MSW treatment is mainly performed by incineration, which does not conform to the main principles of sustainable development. To achieve a more sustainable policy, recycling and/or restriction of nickel-cadmium batteries and plastics turn out to be important issues.

Author

Cadmium; Solid Wastes; Waste Management; Nickel Cadmium Batteries; Incinerators

20070002690 National I-Lan Univ., Taiwan, Province of China

Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells

Chang, Chang-Tang; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 777-782; In English; See also 20070002673

Contract(s)/Grant(s): NSC-91-2623-7-197-002-001; Copyright; Avail.: Other Sources

The study demonstrates a novel attempt to use an aerobic biofiltration system containing entrapped mixed microbial cells (EMMC) for removal of hydrogen sulfide dominant waste gases. In the study, heterotrophic microflora-immobilized cellulose was packed into an EMMC reactor to degrade hydrogen sulfide. Effects of hydrogen sulfide concentrations for continuous operation at various flow rates indicated that hydrogen sulfide removal efficiency is higher than 90% at inlet loadings below 4.31 mg-S/min for retention time of 5.3 minutes. This EMMC biofiltration system also showed high tolerance to fluctuations in flow rates while maintaining stable removal performance. The predicted kinetic constant k and maximum mass loading are 0.018 s⁻¹ and 8.64 mg-S/min, respectively. Adaptability tests in response to gradual shifts up and down of inlet hydrogen sulfide loading indicated that the EMMC microbial communities were well-acclimated to maintain long-term operation stability for continuous treatment.

Author

Filtration; Hydrogen Sulfide; Microorganisms; Aerobes; Flow Velocity; Cellulose

20070003184 General Accounting Office, Washington, DC USA

EXPORT CONTROLS: Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Universities

Dec 2006; 36 pp.; In English

Report No.(s): AD-A459090; GAO-07-70; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459090>; Avail.: CASI: A03, Hardcopy

Foreign students and scholars have made substantial contributions to U.S. research efforts and technology development. However, according to a federal government intelligence assessment, foreign access to sensitive U.S. technology has imposed a significant but unquantifiable cost to the USA. Given this risk, GAO was asked to (1) describe the nature of the research at universities and identify steps they take to comply with export controls and (2) assess efforts by the Departments of Commerce and State the key export control agencies to determine the risk of export violations in university research. GAO reviewed Commerce and State export control programs and met with officials from 13 universities, selected based on their foreign student populations, applications for export licenses, and federal grants and contracts. GAO recommends that Commerce and State use available information to assess potential vulnerabilities and based on this assessment improve outreach, guidance, and interagency coordination. The agencies generally concurred, but State disagreed with our

recommendation on assessing vulnerabilities. Broader assessments would increase State's knowledge of risks and help improve its guidance to universities.

DTIC

International Trade; Regulations; Universities; Vulnerability

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*.

20070002119 Air Force Research Lab., Rome, NY USA

Configurable Aerospace Command and Control (CACC)

Newton, Anthony M; Clough, Jonathan C; Jan 1999; 4 pp.; In English

Report No.(s): AD-A458567; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458567>; Avail.: CASI: A01, Hardcopy

The Configurable Aerospace Command and Control (CACC) program is an evolving concept for a virtual Command and Control (C2) capability that is responsive to the dynamic nature of the future AF operations. It is driven by the needs of the future Joint Force Air Component Commander (JFACC) to be able to respond to a variety of operational scenarios ranging from Major Regional Conflicts (MRC) to Operations Other Than War (OOTW). To respond to this spectrum of requirements with the new Expeditionary Aerospace Force (FAF) concept, key elements of the C2 capability will have to be deployed with the Expeditionary Air Forces (FAFs). To meet the demands of rapid response and minimal airlift, the initial deployed elements will, of necessity, be limited in physical capacity. Heavy dependence will be made of reach back to in-garrison assets to perform many of the C2 functions in collaboration with the deployed elements. As the operation proceeds, the C2 field requirements and needs will change with the evolution of the operation. The CACC will demonstrate the ability of a C2 information system to adapt to the changing needs of dynamic battle management.

DTIC

Command and Control; Aerospace Systems

20070002594 Texas A&M Univ., College Station, TX USA

Wireline ITS Communications Training: Year 1 Report of Activities

Brydia, R. E.; Nov. 2006; 15 pp.; In English

Report No.(s): PB2007-103054; REPT-5-4969-01-1; No Copyright; Avail.: CASI: A03, Hardcopy

This report summarizes the Year 1 activities under implementation project 5-4969-01, Wireline ITS Communications Training. The overall objective of the project is to modify the workshop offerings developed in a previous project to an 8-hour format, and teach the workshop materials at 10 locations across the state, including a pilot workshop. Year 1 activities included workshop modification, pilot course offering, and scheduling of workshops.

NTIS

Communication Networks; Position (Location); Transportation

20070002602 Intelliserv, Inc., Houston, TX, USA

Modulation System for Communication

Hall, D. R.; Batholomew, B.; 4 May 05; 11 pp.; In English

Contract(s)/Grant(s): DE-FC26-01-NT41229

Patent Info.: Filed Filed 4 May 05; US-Patent-Appl-SN-10-906-151

Report No.(s): PB2007-103799; No Copyright; Avail.: CASI: A03, Hardcopy

A system for communication in a downhole tool string comprises an electromagnetic network integrated into the downhole tool string. The electromagnetic network comprises a plurality of band-pass filters and a plurality of network nodes. The plurality of network nodes are along the tool string. The plurality of network nodes is adapted to transmit multiple data bits simultaneously. The system also comprises a server in communication with the electromagnetic network. A method for data transmission in a downhole tool string comprises providing filters in a downhole network and providing a first network node and a second network node. The filters are band-pass filters. The method further comprises modulating a data signal, transmitting multiple bits simultaneously, filtering the data signal, and demodulating the data signal. The data signal is

modulated and the multiple bits are transmitted between the first and second network nodes.

NTIS

Modulation; Patent Applications

20070002626 National Center for Missing and Exploited Children, Arlington, VA, USA

Internet Sex Crimes Against Minors: The Response of Law Enforcement

Wolak, J.; Mitchell, K.; Finkelhor, D.; Nov. 2003; 36 pp.; In English

Contract(s)/Grant(s): OJJDP-98-MC-CX-K002

Report No.(s): PB2007-102282; Copyright; Avail.: National Technical Information Service (NTIS)

As Internet use has become widespread, questions have emerged about how often sexual offenders are using the Internet to commit crimes involving child sexual exploitation and child pornography. Because Internet sex crimes against minors are a recent phenomenon, data about them have not been gathered in a national study. The N-JOV Study is the first national research to systematically collect data about the number and characteristics of arrests for Internet sex crimes against minors. The N-JOV Study had the three goals of: Estimating a baseline number of arrests during a one-year period so that the growth of these cases in the criminal-justice system can be measured in the future; Providing a statistical portrait of the characteristics of Internet sex crimes against minors and description of how they are handled within the criminal justice system; and Organizing the variety of cases into a typology useful for tracking and analysis This bulletin is the first publication of findings from the N-JOV Study. It discusses arrest estimates and gives an overview of the types of crimes, characteristics of offenders, and how the criminal-justice system is handling Internet sex crimes against minors.

NTIS

Children; Crime; Internets; Law (Jurisprudence); Sex; Youth

20070002685 Yuan-Ze Univ., Chung-Li, Taiwan, Province of China

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR randome Structure for the Application of Direction Finding.

CHou, Hsi-Tseng; Hsiao, Yu-Ting; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 923-928; In English; See also 20070002673; Copyright; Avail.: Other Sources

A practical physical optics (PO) implementation procedure is employed to study the radiations of multi-arm spiral antennas in the presence of a body of revolution (BOR) radome structure in direction finding applications. This procedure potentially simplifies the geometrical optics ray tracing procedure based on characteristics of spiral antennas, which is required to define the equivalent currents of PO, and provides efficient formulations to compute the radiation fields due to PO currents that are equivalent to the radiation of spiral antennas in the presence of the same type radome structure.

Author

Physical Optics; Geometrical Optics; Ray Tracing; Radomes; Bodies of Revolution

20070002874 Government Accountability Office, Washington, DC, USA

Telecommunications: FCC Needs to Improve Its Ability to Monitor and Determine the Extent of Competition in Dedicated Access Services

Nov. 2006; 82 pp.; In English

Report No.(s): PB2007-103064; GAO-07-80; No Copyright; Avail.: CASI: [A05](#), Hardcopy

Government agencies and businesses that require significant capacity to meet voice and data needs depend on dedicated access services. This segment of the telecommunications market generated about \$16 billion in revenues for the major incumbent telecommunications firms in 2005. The Federal Communications Commission (FCC) has historically regulated dedicated access prices. With the Telecommunications Act of 1996, FCC reformed its rules to rely on competition to bring about cost-based pricing. Starting in 2001, FCC granted pricing flexibility on the basis of a proxy measure of competition. GAO examined (1) the extent that alternatives are available in areas where FCC granted pricing flexibility, (2) how prices have changed since the granting of pricing flexibility, and the effect on government agencies, and (3) how FCC monitors competition. GAO's work included analyzing data on competitive alternatives, list prices, and average revenue, and interviewing FCC officials and industry representatives.

NTIS

Competition; Telecommunication

20070002894 National Inst. of Information and Communications Technology, Japan

Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals

Kuri, Toshiaki; Toda, Hiroyuki; Kitayama, Ken-ichi; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 39-46; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Optical-frequency-interleaved dense wavelength division multiplexing (DWDM) transmission of millimeter-wave-band subcarrier-multiplexed (SCM) radio-on-fiber (RoF) signals with a photonic down-conversion technique is described. The photonic downconversion technique is carried out for a lump of all multiplexed RoF signals at the receiver side. Error-free 25-GHz-spacing DWDM transmission and demultiplexing of two 60-GHz-band SCM RoF signals carrying 155-Mb/s differential phase-shift-keying data over 25-km-long standard single-mode fiber are experimentally demonstrated without serious fiber dispersion effect.

Author

Down-Converters; Wavelength Division Multiplexing; Microwave Transmission; Fiber Optics; Phase Shift Keying; Radio Signals; Optical Fibers

20070003026 California Univ., Santa Cruz, CA USA

Efficient Routing in Packet-Radio Networks Using Link-State Information

Garcia-Luna-Aceves, J J; Spohn, Marcelo; Jan 1999; 6 pp.; In English

Contract(s)/Grant(s): F30602-97-2-0338

Report No.(s): AD-A458849; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458849>; Avail.: CASI: [A02](#), Hardcopy

We present the source-tree adaptive routing (STAR) protocol, which we show through simulation experiments to be far more efficient than the Dynamic Source Routing (DSR) protocol, which has been shown to be one of the best performing on-demand routing protocols. A router in STAR communicates to its neighbors the parameters of its source routing tree, which consists of each link that the router needs to reach every destination. To conserve transmission bandwidth and energy, a router transmits changes to its source routing tree only when the router detects new destinations, the possibility of looping, or the possibility of node failures or network partitions.

DTIC

Networks; Radiotelephones

20070003066 Massachusetts Inst. of Tech., Cambridge, MA USA

Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications

Learned, Rachel E; Krim, Hamid; Willisky, Alan S; Apr 1996; 5 pp.; In English

Contract(s)/Grant(s): F49620-95-1-0083; DAAL03-92-G-0115

Report No.(s): AD-A458905; LIDS-P-2328; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458905>; Avail.: CASI: [A01](#), Hardcopy

This paper addresses the problem of signature set design for uncoded multiple access (MA) communication in which user signature waveforms are linearly dependent. In general, the linearly dependent or 'over-saturated' scenario requires an exponentially complex detector. The recent introduction of an optimal tree-structured joint detector of extremely low complexity ([1, 2]) has sparked our interest in signature set choice for over-saturated MA communications. The tree detector requires the set of linearly dependent user signatures to have tree-structured cross-correlations. This design guideline is a natural by-product of redundant wavelet packet signals. In this paper we explore, via simulations, the performance of wavelet packet signature sets and find them to do very well in general and to offer promising behavior with the introduction of arbitrary carrier phase.

DTIC

Multiple Access; Telecommunication; Wavelet Analysis

20070003088 Washington Univ., Seattle, WA USA

A General Probabilistic Model for Improving Key Assignment in Wireless Networks

Tague, Patrick; Poovendran, Radha; Jan 2006; 10 pp.; In English

Report No.(s): AD-A458933; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458933>; Avail.: CASI: [A02](#), Hardcopy

We study the problem of establishing secure communication channels in resource-constrained wireless networks using

key predistribution. Pairwise communication channels between nodes are secured using link keys which are established as a function of cryptographic seeds predistributed to each node. We propose a general model for seed assignment which regulates the number of nodes sharing each seed. In addition, we provide a general model for wireless network connectivity where communication is restricted by both radio range and an independent pairwise relationship. We provide probabilistic analysis for network connectivity and resilience to node capture in terms of our seed assignment and network connectivity models. Finally, we provide a numerical example demonstrating how the proposed approach reduces key wastage while maintaining resilience to node capture of prior results.

DTIC

Communication Networks; Probability Theory; Telecommunication

20070003089 Washington Univ., Seattle, WA USA

Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach

Lazos, L; Poovendran, R; Meadows, C; Syverson, P; Chang, L W; Jan 2005; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): ANI-0093187; DAAD19-02-1-0242

Report No.(s): AD-A458934; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458934>; Avail.: CASI: [A02](#),
Hardcopy

We study the problem of characterizing the wormhole attack, an attack that can be mounted on a wide range of wireless network protocols without compromising any cryptographic quantity or network node. Making use of geometric random graphs induced by the communication range constraint of the nodes, we present the necessary and sufficient conditions for detecting and defending against wormholes. Using our theory, we also present a defense mechanism based on local broadcast keys. We believe our work is the first one to present analytical calculation of the probabilities of detection. We also present simulation results to illustrate our theory.

DTIC

Communication Networks; Graph Theory; Telecommunication

20070003129 Carnegie-Mellon Univ., Pittsburgh, PA USA

A Typology for C2 Measures

Carley, Kathleen M; Krackhardt, David; Jan 1999; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-97-1-0037

Report No.(s): AD-A458997; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458997>; Avail.: CASI: [A03](#),
Hardcopy

Numerous measures of the C2 structure have been developed. The goal is to develop a small, meaningful, and predictive set. Work in this area, however, has been hampered by a lack of a standard categorization schema. Such a schema is presented herein. This schema is based on the recognition that many aspects of C2 structures can be represented as graphs. The proposed typology enables graph-theoretic based measures of C2 structures to be contrasted and analyzed in a systematic fashion. Results indicate a dearth of measures that link more than one submatrix. Attempts at predicting the performance of organizations based on a single sub-matrix typically fail. Predictions, such as those herein, that are based on multiple sub-matrices at once fare better. Using this typology, the authors defined the C2 structure of three teams, examined in a laboratory setting. Use of the typology as a representation scheme enabled the three teams to be simulated. These simulations suggested that the reason for differences in performance had to do with the relative ability of information about what others are doing, versus what resources are needed for what through the structure defined by multiple sub-matrices.

DTIC

Command and Control; Measurement

20070003148 Idaho Univ., Moscow, ID USA

Support Platform and Communications to Manage Cooperative AUV Operations

Cuff, T R; Wall, R W; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-04-1-0506; N00014-04-1-0803

Report No.(s): AD-A459033; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459033>; Avail.: CASI: [A02](#),
Hardcopy

For the testing of control and communications algorithms in cooperative behavior, a fleet of autonomous underwater vehicles (AUVs) is under development by the University of Idaho. This paper discusses one piece of the puzzle in this fleet:

the communications module to manage multiple agents. The communications system provides multiple modes of operation. Different communications mediums to and from the vehicle support these modes of operation. The tools supplied by the different modes of operation assist the researchers in developing communications, control algorithms, and valuable hardware systems.

DTIC

Control Boards; Underwater Vehicles

20070003202 Library of Congress, Washington, DC USA

The Middle East Television Network: An Overview

Sharp, Jeremy M; Feb 9, 2005; 7 pp.; In English

Report No.(s): AD-A459126; CRS-RS21565; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459126>; Avail.:

CASI: **A02**, Hardcopy

With the USA engaged in Iraq, Afghanistan, and the war on terrorism, Congress and the Bush Administration have created a U.S. government-sponsored Arabic-language television station to bolster U.S. public diplomacy efforts in the Middle East. Supporters of this initiative have asserted that there is a receptive audience for U.S. television, which could counterbalance negative perceptions of U.S. policy that are commonly found in the Arab media. Critics maintain that the Arab media market is already saturated with Western stations and that U.S. public diplomacy funds would be more effectively used in other programs. According to the 9/11 Commission Report, the government has begun some promising initiatives in television and radio broadcasting to the Arab world, Iran, and Afghanistan. These efforts are beginning to reach large audiences. The Broadcasting Board of Governors has asked for much larger resources. It should get them. The Administration has requested \$79 million for FY2006, a figure that incorporates operations for the satellite television network Al-Hurra (Arabic for 'the free one'), which began broadcasting in February 2004.

DTIC

Middle East; Television Systems

20070003215 University of Southern California, Marina del Rey, CA USA

Ideas on Multi-layer Dialogue Management for Multi-party, Multi-conversation, Multi-modal Communication (Extended Abstract of Invited Talk),

Traum, David R; Jan 2006; 8 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459156; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459156>; Avail.: CASI: **A02**,

Hardcopy

Most current dialogue systems concern only a short dialogue between a single system and single user, focused on a single task. On the other hand, the full spectrum of communication between interacting agents includes cases in which multiple segments of conversation can be interleaved with other, sometimes unrelated actions and events (e.g., a cocktail party). Language use in the Mission Rehearsal Exercise Project at ICT (Swartout, Hill, Gratch, Johnson, Kyriakakis, Labore, Lindheim, Marsella, Miraglia, Moore, Morie, Rickel, Thieboux, Tuch, Whitney and Douglas 2001) falls between these two extremes, having one main purpose (Army platoon-level leadership training using virtual reality and virtual humans), but multiple characters, each with its own goals, interests, and capabilities. In this scenario, multiple characters must engage in dialogue, both with each other and with the human trainee. Moreover, multiple conversations are involved, each with a distinct context for interpretation. The conversations are also multimodal in two senses. First, communication can occur not just with speech, but also with visual media including gesture and gaze of artificial characters, and secondly different media sets must be used for different communications, e.g., face-to-face communication for some characters and radio communication for others who are not physically co-present. We present here a multiple layer approach towards modelling and managing these complexities, including who is accessible for conversation, paying attention, involved in a conversation, as well as turn-taking, initiative, grounding, and higher-level dialogue functions. The method will follow that used in the Trindi project, where one specifies an information state, and 'dialogue moves' representing input and output, as well as associated updates to information state.

DTIC

Communication Networks; Conversation; Physical Exercise

20070003216 University of Southern California, Marina del Rey, CA USA

Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue

Robinson, Susan; Martinovski, Bilyana; Garg, Saurabh; Stephan, Jens; Traum, David; Jan 2006; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459157; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459157>; Avail.: CASI: [A01](#), Hardcopy

This paper describes the development of a multi-modal corpus based on multi-party multi-task driven common goal oriented spoken language interaction. The data consists of approximately 10 hours of audio human simulation radio data and nearly 5 hours of video and audio face-to-face sessions between human trainees and virtual agents.

DTIC

Communication Networks; Physical Exercise

20070003288 Idaho Univ., Moscow, ID USA

Identifying Error in AUV Communication

Coleman, Joseph; Merrill, Kaylani; O'Rourke, Michael; Rajala, Andrew G; Edwards, Dean B; Jan 2006; 9 pp.; In English

Contract(s)/Grant(s): N00014-05-1-0674

Report No.(s): AD-A459285; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459285>; Avail.: CASI: [A02](#), Hardcopy

Mine Countermeasures (MCM) involving Autonomous Underwater Vehicles (AUVs) are especially susceptible to error, given the constraints on underwater acoustic communication and the inconstancy of the underwater communication channel. Little work has been done to systematize error identification and response in AUV communication. We introduce a systematic approach involving Design Failure Mode and Effects Analysis (DFMEA) that is adapted to the complex character of communication between autonomous agents.

DTIC

Errors; Identifying; Underwater Communication; Underwater Vehicles

20070003331 University of Southern California, Los Angeles, CA USA

Limited Domain Synthesis of Expressive Military Speech for Animated Characters

Johnson, W L; Narayanan, Shrikanth; Whitney, Richard; Das, Rajat; LaBore, Catherine; Jan 2002; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459392; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459392>; Avail.: CASI: [A01](#), Hardcopy

Text-to-speech synthesis can play an important role in interactive education and training applications, as voices for animated agents. Such agents need high-quality voices capable of expressing intent and emotion. This paper presents preliminary results in an effort aimed at synthesizing expressive military speech for training applications. Such speech has acoustic and prosodic characteristics that can differ markedly from ordinary conversational speech. A limited domain synthesis approach is used employing samples of expressive speech, classified according to speaking style. The resulting synthesizer was tested both in isolation and in the context of a virtual reality training scenario with animated characters.

DTIC

Speech; Symbols

20070003332 Massachusetts Inst. of Tech., Cambridge, MA USA

Efficient Symbol-Spreading Strategies for Wireless Communication

Wornell, Gregory W; Oct 1994; 82 pp.; In English

Contract(s)/Grant(s): N00014-93-1-0686; AFOSR-91-0034

Report No.(s): AD-A459393; RLE-TR-587; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459393>; Avail.: CASI: [A05](#), Hardcopy

Some efficient new classes of algorithms for compensating for fading in wireless systems are introduced. For single-user or frequency-division multiplexed wireless systems, we develop a technique we refer to as spread-response precoding which replaces the interleaver traditionally used in conjunction with coding in such systems. From the perspective of the coded symbol stream, spread-response precoding effectively transforms an arbitrary Rayleigh fading channel into a nonfading,

simple white marginally Gaussian noise channel with no intersymbol interference. Furthermore, spread-response precoding requires no additional power or bandwidth, and is attractive in terms of computational complexity, robustness, and delay considerations. In the multiuser case, spread-response precoding generalizes to a new class of orthogonal codedivision multiple-access (CDMA) systems for efficient communication in environments subject to multipath fading phenomena. The key characteristic of these new systems, which we refer to as 'spread-signature CDMA' systems, is that the associated signature sequences are significantly longer than the interval between symbols. Using this approach, the transmission of each symbol of each user is, in effect, spread over a wide temporal and spectral extent, which is efficiently exploited to combat the effects of fading. Both efficient signature sets and efficient receiver structures for such systems are developed. Several aspects of the performance of the resulting spread-signature CDMA systems are presented, including both the achievable bit error rate characteristics as well as the effective capacity of such systems. The results suggest that spread-signature CDMA may be an attractive alternative to conventional CDMA in a variety of application scenarios.

DTIC

Algorithms; Spreading; Symbols; Wireless Communication

20070003333 University of Southern California, Los Angeles, CA USA

Limited Domain Synthesis of Expressive Military Speech for Animated Characters

Johnson, W L; Narayanan, S; Whitney, R; Das, R; Bulut, M; LaBore, C; Jan 2002; 5 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459395; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459395>; Avail.: CASI: A01,

Hardcopy

Text-to-speech synthesis can play an important role in interactive education and training applications, as voices for animated agents. Such agents need high-quality voices capable of expressing intent and emotion. This paper presents preliminary results in an effort aimed at synthesizing expressive military speech for training applications. Such speech has acoustic and prosodic characteristics that can differ markedly from ordinary conversational speech. A limited domain synthesis approach is used employing samples of expressive speech, classified according to speaking style. The resulting synthesizer was tested both in isolation and in the context of a virtual reality training scenario with animated characters.

DTIC

Speech; Symbols

20070003358 California Univ., Santa Cruz, CA USA

Distributed Assignment of Codes in Multihop Radio Networks

Raju, Jyoti; Jun 1998; 60 pp.; In English

Contract(s)/Grant(s): DAAB07-95-C-D157

Report No.(s): AD-A459447; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459447>; Avail.: CASI: A04,

Hardcopy

Code assignment is necessary for the proper functioning of an ad-hoc CDMA network. Due to the irregular topology of ad-hoc networks, an optimal and distributed solution for the code-assignment problem is NP-Complete. This thesis presents a distributed greedy algorithm for assigning codes in a dynamic, multihop wireless CDMA radio network. The same algorithm can be used to assign channels in a multichannel CSMA/CA network. The algorithm does not require any form of synchronization and is completely distributed. It can be used for both the transmitter oriented and receiver oriented code assignment. The algorithm is proven to be correct and its complexity is analyzed. The algorithm has been implemented to assign channels in a multi-channel CSMA/CA network. The results from the implementation are presented here and it is shown that the algorithm is scalable and works correctly in mobile environments.

DTIC

Communication Networks; Telecommunication

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*.

20070002106 Prideco (Grant), L.P., Houston, TX, USA

Internal Coaxial Cable Electrical Connector for Use in Downhole Tools

Hall, D. R.; Hall, T.; Pixton, D. S.; Dahlgren, S.; Fox, J.; 5 Nov 03; 15 pp.; In English

Contract(s)/Grant(s): DE-FC26-97FT343656

Patent Info.: Filed 5 Nov 03; US-Patent-Appl-SN-10-605-911

Report No.(s): PB2007-100857; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A coaxial cable electrical connector more specifically an internal coaxial cable connector placed within a coaxial cable connector is in electrical communication with an inductive transformer and a coaxial cable. The connector is in electrical communication with the outer housing of the inductive transformer. A generally coaxial center conductor, a portion of which could be the coil in the inductive transformer, passes through the connector, is electrically insulated from the connector, is electrically insulated from the connector, and is in electrical communication with conductive core of the coaxial cable. A plurality of bulbous pliant tabs on the coaxial cable connector mechanically engage the inside diameter of the coaxial cable thus grounding the transformer to the coaxial cable. The coaxial cable and inductive transformer are disposed within downhole tools to transmit electrical signals between downhole tools within a drill string. The internal coaxial cable connector can be used in a plurality of downhole tools, such as sections of pipe in a drill string, drill collars, heavy weight drill pipe, and jars.

NTIS

Coaxial Cables; Data Transmission; Drilling; Electric Connectors; Patent Applications

20070002556 Welch (James D.), Omaha, NE, USA

Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor

Welch, J. D.; 18 Oct 04; 31 pp.; In English

Contract(s)/Grant(s): DE-FG47-93R701314

Patent Info.: Filed 18 Oct 04; US-Patent-Appl-SN-10-967-774

Report No.(s): PB2007-103790; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Semiconductor devices formed in fully or partially compensated semiconductor, substrate or epi-layer, including minimal current flow voltage switching devices with at least one junction which is rectifying when the semiconductor is caused to be N or P-type by the presence of applied gate voltage field induced carriers, such as inverting and non-inverting gate voltage channel induced semiconductor single devices with operating characteristics similar to conventional multiple device CMOS systems.

NTIS

CMOS; Patent Applications; Semiconductor Devices; Semiconductors (Materials)

20070002559 Michigan State Univ., East Lansing, MI, USA

Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006

Baker, G. L.; Ghoch, R. N.; Osborn, D. J.; Zhang, P.; January 2006; 21 pp.; In English

Contract(s)/Grant(s): DE-FC26-02NT41582

Report No.(s): DE2006-892152; No Copyright; Avail.: National Technical Information Service (NTIS)

A reflection mode fiber optic oxygen sensor that can operate at high temperatures for power plant applications is being developed. The sensor is based on the $3O_2$ quenching of the red emission from hexanuclear molybdenum chloride clusters. Our approach towards immobilizing the potassium salt of the molybdenum cluster, $K_2Mo_6Cl_{14}$, at the far end of an optical fiber is to embed the cluster in a thermally cured sol-gel matrix particle. This particle-in-binder approach affords fibers with greatly improved mechanical properties, as compared to previous approaches. The sensor was characterized in 2 - 21 % gas phase oxygen at 40, 70 and 100C. These are promising results for a high temperature fiber optical oxygen sensor based on molybdenum chloride clusters.

NTIS

Detection; Fiber Optics; Gas Detectors; Optical Measuring Instruments; Oxygen

20070002560 Oak Ridge National Lab., TN USA

Annual Technical Progress Report of Radioisotope Power System Materials Production and Technology Program Tasks for October 1, 2004 through September 30, 2005

January 2006; 43 pp.; In English

Report No.(s): DE2006-890618; No Copyright; Avail.: National Technical Information Service (NTIS)

The Office of Space and Defense Power Systems of the Department of Energy (DOE) provides Radioisotope Power Systems (RPS) for applications where conventional power systems are not feasible. For example, radioisotope thermoelectric generators were supplied by the DOE to the National Aeronautics and Space Administration for deep space missions including the Cassini Mission launched in October of 1997 to study the planet Saturn. For the Cassini Mission, ORNL produced carbon-bonded carbon fiber (CBCF) insulator sets, iridium alloy blanks and foil, and clad vent sets (CVS) used in the generators. The Oak Ridge National Laboratory (ORNL) has been involved in developing materials and technology and producing components for the DOE for more than three decades. This report reflects program guidance from the Office of Space and Defense Power Systems for fiscal year (FY) 2005. Production activities for prime quality (prime) CBCF insulator sets, iridium alloy blanks and foil, and CVS are summarized in this report. Technology activities are also reported that were conducted to improve the manufacturing processes, characterize materials, or to develop information for new radioisotope power systems.

NTIS

Production Planning; Radioisotope Batteries

20070002598 King and Schickli, PLLC, Lexinton, NY, USA

Micro Neutron Detectors

McGregor, D. S.; Ohmes, M. F.; Shultis, J. K.; 28 Jul 05; 49 pp.; In English

Contract(s)/Grant(s): DE-FG03-02SF22611

Patent Info.: Filed Filed 28 Jul 05; US-Patent-Appl-SN-11-191-899

Report No.(s): PB2007-103802; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Micro neutron detectors include relatively small pockets of gas including a neutron reactive material. During use, under a voltage bias in a neutron environment, neutron interactions in the neutron reactive material are seen to occur. Ultimately, electron-ion pairs form and positive ions drift to a cathode and electrons to the anode. The motion of charges then produces an induced current that is sensed and measurable, thereby indicating the presence of neutrons. Preferred pocket volumes range from a few cubic microns to about 1200 mm.³; neutron reactive materials include fissionable, fertile or fissile material (or combinations), such as ²³⁵U, ²³⁸U, ²³³U, ²³²Th, ²³⁹Pu, ¹⁰B, ⁶Li and ⁶LiF; gasses include one or more of argon, P-10, ³He, BF₃, CO₂, Xe, C₄H₁₀, CH₄, C₂H₆, CF₄, C₃H₈, dimethyl ether, C₃H₆ and C₃H₈. Arrangements include two- and three-piece sections, arrays (including or not triads capable of performing multiple detecting functions) and/or capillary channels.

NTIS

Neutron Counters; Patent Applications; Radiation Detectors; Semiconductor Devices

20070002601 BAE Systems and Technology, Nashua, NH, USA

Sense Amplifier for Static Random Access Memories

Lawson, D. C.; Maher, E.; Ramaswamy, S.; Hoang, T. M.; 10 Jul 04; 6 pp.; In English

Contract(s)/Grant(s): DSA01-96-C-0106

Patent Info.: Filed Filed 10 Jul 04; US-Patent-Appl-SN-10-890-430

Report No.(s): PB2007-103800; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A sense amplifier for static random access memories is disclosed. The sense amplifier includes a pair of inverters cross-coupled to each other. The sense amplifier also includes means for equalizing the charges within the pair of inverters before performing a sense operation, and means for sensing a current difference between a bitline and its complement from a memory cell during the sense operation.

NTIS

Patent Applications; Random Access Memory; Amplifiers

20070002629 Maine and Asmus, Nashua, NH, USA

High Frequency Via

Greeley, J. S.; 30 Aug 04; 8 pp.; In English

Patent Info.: Filed Filed 30 Aug 04; US-Patent-Appl-SN-10-903-566

Report No.(s): PB2007-103791; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Techniques that enable the transitioning of high frequency signals on a printed wiring board processed in accordance with industry standards (such as the IPC specifications) are disclosed. One embodiment provides a high frequency via structure for a printed wiring board, where the via structure includes a via pad configured in accordance with IPC standards. A printed microwave transmission line having an inductive section is connected to the via pad, wherein the inductive section has dimensions to compensate for transition discontinuity.

NTIS

High Frequencies; Microwave Transmission; Patent Applications

20070002676 Wufeng Technology of Institute, Chiayi, Taiwan

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm

Ho, Mingsu; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 929-932; In English; See also 20070002673; Copyright; Avail.: Other Sources

One-dimensional numerical simulation results of plane Gaussian electromagnetic pulses reflected from constantly moving and vibrating perfect conductors are provided in this paper. The computational data were obtained using the characteristic-based algorithm with the aid of relativistic boundary conditions and characteristic variable boundary conditions. Since the perfect conductor can travel and vibrate simultaneously, the size of the grid cell immediately next to the boundary and the corresponding numerical time-step are time-dependent. The present numerical method has been shown to accurately handle such problems. In this paper both the reflected electric field intensities and the corresponding spectra are illustrated. The calculated Doppler shifts are found to have good agreement with the theoretical values.

Author

Electromagnetic Pulses; Scattering; Algorithms; Doppler Effect; Electric Fields; Boundary Conditions; Vibration

20070002679 Feng Chia Univ., Taichung, Taiwan, Province of China

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings

Shiah, Yui-Chuin; Huang, Chien-Hsin; Huang, Jin H.; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 893-902; In English; See also 20070002673

Contract(s)/Grant(s): NSC 94-2212-E-035-011; Copyright; Avail.: Other Sources

This article presents the analysis for the electromechanical responses of optical fibers coated with piezoelectric materials. The piezoelectric coatings, functioning as sensors or actuators, have potentials in the development of novel acousto-optic devices. Despite the growing demand for optical fibers coated with piezoelectric materials, the research on their integrated system electromechanical responses still remains largely unexplored. The present study focuses on doubly clad optical fibers that are commonly commercially used. By use of Hamilton's principle applied to piezoelectric fundamentals, we successfully solve the governing equations for piezoelectric coatings polarized in the radial direction. Using the derived analytical formulations, numerical examples are investigated for direct and converse effects of such integrated optical fibers.

Author

Optical Fibers; Electromechanics; Piezoelectricity; Coatings; Acousto-Optics

20070002754 Honeywell International, Inc., Morristown, NJ, USA

Method for Fabricating Giant Magnetoresistive (GMR) Devices

Baseman, D. L.; Berg, L. L.; Katti, R. R.; Reed, D. S.; Shaw, G. A.; 12 Nov 03; 12 pp.; In English

Contract(s)/Grant(s): DTRA01-00-C-0002

Patent Info.: Filed Filed 12 Nov 03; US-Patent-Appl-SN-10-706 531

Report No.(s): PB2007-100875; No Copyright; Avail.: CASI: [A03](#), Hardcopy

In a method of fabricating a giant magnetoresistive (GMR) device a plurality of magnetoresistive device layers is deposited on a first silicon nitride layer formed on a silicon oxide layer. A etch stop is formed on the magnetoresistive device layers, and a second layer of silicon nitride is formed on the etch stop. The magnetoresistive device layers are patterned to define a plurality of magnetic bits having sidewalls. The second silicon nitride layer is patterned to define electrical contact portions on the etch stop in each magnetic bit. The sidewalls of the magnetic bits are covered with a photoresist layer. A

reactive ion etch (RIE) process is used to etch into the first silicon nitride and silicon oxide layers to expose electrical contacts. The photoresist layer and silicon nitride layers protect the magnetoresistive layers from exposure to oxygen during the etching into the silicon oxide layer.

NTIS

Fabrication; Magnetoresistivity; Patent Applications

20070002757 Ostrager Chong Flaherty and Broiman LLP, New York, NY, USA

Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements

Hazard, C. R.; Wodnicki, R. G.; Fisher, R. A.; 29 Oct 04; 34 pp.; In English

Contract(s)/Grant(s): DAMD-17-02-1-01-0181

Patent Info.: Filed 29 Oct 04; US-Patent-Appl-SN-10-978 175

Report No.(s): PB2007-100871; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The reconfigurable ultrasound array disclosed herein is one that allows groups of subelements to be connected together dynamically so that the shape of the resulting element can be made to match the shape of the wave front. This can lead to improved performance and/or reduced channel count. Reconfigurability can be achieved using a switching network. A methodology and an algorithm are disclosed that allows the performance of this switching network to be improved by properly choosing the configuration of the switching network.

NTIS

Patent Applications; Switching

20070002789 Computer Sciences Corp., Moffett Field, CA, USA

NanoElectronics and BioElectronics

Srivastava, Deepak; [2001]; 29 pp.; In English; IBC's Nano-Biotechnology Conference, 16-17 Jul. 2001, San Diego, CA, USA; Original contains black and white illustrations

Contract(s)/Grant(s): RTOP 704-40-32; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002789>; Avail.: CASI:

[A03](#), Hardcopy

This viewgraph presentation reviews the use of Carbon Nanotube electronics in the bioelectronics. Included is a brief review of the carbon nanotube manufacturing, the use of carbon nanotubes in Atomic Force Microscopy (AFM), and Computational Nanotechnology, that allows designers to understand nanotube characteristics and serves as a design tool.

CASI

Carbon Nanotubes; Nanotechnology; Nanostructure (Characteristics)

20070002858 World Technology Evaluation Center, Baltimore, MD, USA

WTEC Panel Report on Spin Electronics

Awschalom, D. D.; Buhrman, R. A.; Daughton, J. M.; Roukes, M. L.; von Molnar, S.; Aug. 2003; 168 pp.; In English

Contract(s)/Grant(s): NSF-ENG-0104476; ONR-N00014-01-1-0807

Report No.(s): PB2007-103564; Copyright; Avail.: National Technical Information Service (NTIS)

This report is a comparative review of spin electronics ('spintronics') research and development activities in the USA, Japan, and Western Europe conducted by a panel of leading U.S. experts in the field. It covers materials, fabrication and characterization of magnetic nanostructures, magnetism and spin control in magnetic nanostructures, magneto-optical properties of semiconductors, and magnetoelectronics and devices. The panel's conclusions are based on a literature review and a series of site visits to leading spin electronics research centers in Japan and Western Europe. The panel found that Japan is clearly the world leader in new material synthesis and characterization; it is also a leader in magneto-optical properties of semiconductor devices. Europe is strong in theory pertaining to spin electronics, including injection device structures such as tunneling devices, and band structure predictions of materials properties, and in development of magnetic semiconductors and semiconductor heterostructures.

NTIS

Spin; Research and Development; Nanostructures (Devices); Electronics

20070002888 National Inst. of Information and Communications Technology, Japan

Review of the National Institute of Information and Communications Technology, Volume 52, No. 3

September 2006; ISSN 1349-3191; 101 pp.; In Japanese; See also 20070002889 - 20070002898; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Topics covered include: Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot; Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks; Novel Photonic Devices Based on Electro-optic Modulation Technologies; Supercontinuum Generation and its Applications; Dense Multiplexing and Transmission Technique of Millimeter- Wave-Band Radio-on-Fiber Signals; Secure Communication with Quantum Cryptography; Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution; Status of Development of Photon Number Resolving Detectors; Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation; and Quantum Network Consisting of Laser-cooled Ions and Photons.

Derived from text

Information Systems; Electro-Optics; Quantum Cryptography; Millimeter Waves; Semiconductors (Materials); Signal Measurement; Multiplexing

20070002889 National Inst. of Information and Communications Technology, Japan

Secure Communication with Quantum Cryptography

Hasegawa, Toshio; Nishioka, Tsuyoshi; Ishizuka, Hirokazu; Nambu, Yoshihiro; Tomita, Akihisa; Tajima, Akio; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 55-62; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Quantum cryptography, which has the advantage of being able to detect eavesdropping on communication channels and security guaranteed by a fundamental physical law, is expected as an absolutely unbreakable cryptography. In 2001, Mitsubishi, NEC and the University of Tokyo started the NICT project 'Research and Development on Quantum Cryptography', which includes four research themes: single photon generation, single photon detection, random number generation, and quantum key distribution system. In this paper, we introduce our research activities and some results. In Mitsubishi's part, we report the long-distance field experiment in 96-km installed fiber (JGNIT) and the integrated quantum cryptosystem with existing cryptosystem. In NEC's part, we show fortnight continuous key generation field trial over the 16.3-km commercial access fibers and novel backscattering-free unidirectional QKD system based on planar lightwave circuit platforms.

Author

Channels (Data Transmission); Quantum Cryptography; Circuits; Photons

20070002890 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan

Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution

Takesue, Hiroki; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 63-68; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Generation of quantum entangled photon pair in the 1.5-micron telecom band is an important technology for realizing quantum communication systems over optical fiber networks. This paper reports generation of 1.5-micron entangled photon pairs using spontaneous four-wave mixing in an optical fiber conducted by NTT Basic Research Laboratories. A new entanglement-based quantum key distribution scheme is also briefly described.

Author

Quantum Communication; Optical Fibers; Telecommunication; Four-Wave Mixing

20070002891 National Inst. of Information and Communications Technology, Japan

Status of Development of Photon Number Resolving Detectors

Fujiwara, Mikio; Tsujino, Kenji; Akiba, Makoto; Sasaki, Masahide; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 69-76; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Photon number resolving detectors that can count number of photons in the pulses precisely are the important devices for developing universal photonic quantum gates, by combination with W1% non-classical light. This technology will be used to establish quantum decoders that offer a significant upsurge in the capacity of communications channel. We describe our research activities for developing of photon number resolving detectors.

Author

Quantum Communication; Quantum Cryptography; Photons; Decoders

20070002892 National Inst. of Information and Communications Technology, Japan

Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation

Kitagawa, Akira; Sasaki, Masahide; Takeoka, Masahiro; Chefles, Anthony; Lutkenhaus, Norbert; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 77-86; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

On the current communication scheme, Gaussian coherent state signals play an important role. To make use of a potential of coherent state signals going beyond the shot noise limit, not only Gaussian operations, but also non-Gaussian operations, described as the third or higher order interactions with respect to the electric field amplitude, must essentially be applied. In this a manuscript, we discuss our recent results on the enhancement of entanglement and quantum signal discrimination via the measurement-induced non-Gaussian operation with the photon detector and linear optics.

Author

Signal Measurement; Electric Fields; Shot Noise; Photons

20070002893 National Inst. of Information and Communications Technology, Japan

Quantum Network Consisting of Laser-cooled Ions and Photons

Hayasaka, Kazuhiro; Keller, Matthias; Lange, Birgit; Lange, Wolfgang; Walther, Herbert; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 87-96; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Peculiar states, such as superposition, quantum entanglement, have no counterparts in classical mechanics, and are of characteristic of quantum mechanics. Quantum networks are those in which the quantum states are faithfully communicated. Applications of quantum networks include distributed quantum computation connecting small-sized quantum computers, quantum bit commitment based on quantum entanglement, and quantum authentication that enables votes and transactions with assured security on personal information. We report studies at NICT towards a working prototype of quantum network consisting of laser-cooled ions and photons.

Author

Quantum Computers; Computer Information Security; Quantum Computation; Classical Mechanics; Lasers; Quantum Mechanics

20070002895 National Inst. of Information and Communications Technology, Japan

Supercontinuum Generation and its Applications

Sotobayashi, Hideyuki; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 33-38; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

In this paper, we describe the design theory for the supercontinuum spectrum generation in an optical fiber. To generate a wideband supercontinuum spectrum, the balance between fiber nonlinearity and the amount of group velocity dispersion is important. Secondly, the experimental results of supercontinuum generation are shown. A few kinds of optical fibers such as a highly nonlinear dispersion-shifted fiber and a highly nonlinear bismuth-oxide fiber are tested. Finally several applications of supercontinuum light are described. We demonstrate multi-wavelength light source, multiplexing format conversion, and optical characterization using a supercontinuum light source.

Author

Light Sources; Multiplexing; Broadband; Velocity Distribution; Optical Fibers; Characterization

20070002896 National Inst. of Information and Communications Technology, Japan

Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks

Liang, Tak-Keung; Nunes, Luis Romeu; Tsang, Hon Ki; Tsuchiya, Mashiro; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 13-24; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Silicon photonics technology has attracted immense research interest because it offers low cost optoelectronics solutions for telecommunications applications. In silicon-on-insulator optical waveguides, light is confined in a single-crystal silicon layer separated from the substrate by a thin layer of buried silicon dioxide. The large step in refractive index enables a tight confinement of light in a small waveguide area, which can be exploited to achieve high optical intensity propagation. Thus many practical nonlinear optical devices can be realized in these waveguides. In this paper, we study the optical nonlinearities in silicon waveguides, including two-photon absorption, free-carrier absorption and stimulated Raman scattering. Several silicon-based photonic devices have been developed for future communications systems, including waveguide two-photon

absorption autocorrelator, ultrafast optical silicon optical switches and waveguide optical Raman amplifier.

Author

Amplification; Electro-Optics; Optical Equipment; Photonics; Silicon; Switches; Communication Networks

20070002897 National Inst. of Information and Communications Technology, Japan

Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot

Akahane, Kouichi; Yamamoto, Naokatsu; Gozu, Shin-ichiro; Ueta, Akio; Ohtani, Naoki; Tsuchiya, Masahiro; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 3-11; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Strain-compensation methods were developed to multiply self-assembled semiconductor quantum dot (QD) layer. Although self-assembled technique in lattice mismatched material systems have been attracted much attentions to fabricate semiconductor nano-structures, for example, semiconductor QD, it is difficult to fabricate high density QD because of accumulation of strain energy. In this research, we fabricated ultra-high density quantum dot which was stacking of 150 QDs layers by using strain compensation methods. The density of QDs exceeds $5 \times 10^{12}/\text{cm}^2$ which is world's highest density. A strong emission from this sample was observed at around 1.5 μm even at room temperature. The emission Wavelength is suitable for fiber-optic communications systems. Therefore, our technique for growing stacked QDs has potential in applications for constructing novel high-performance QD devices for these communications systems.

Author

Fabrication; Quantum Dots; Semiconductors (Materials); Structural Strain

20070002898 National Inst. of Information and Communications Technology, Japan

Novel Photonic Devices Based on Electro-optic Modulation Technologies

Sakamoto, Takahide; Shinada, Satoshi; Kawanishi, Tetsuya; Tsuchiya, Masahiro; Yu, Paul Kit Lai Yu; Izutsu, Masayuki; Review of the National Institute of Information and Communications Technology, Volume 52, No. 3; September 2006, pp. 25-31; In Chinese; See also 20070002888; Copyright; Avail.: Other Sources

Recent progresses in optical modulation using electro-optic effects have renewed photonic signal processing technologies crucial in future advanced optical communication systems. NICT is now exploring novel functional photonic devices and subsystems based on electro-optic modulation technologies. In this paper, we review on recent research activities in NICT around these exotic technologies, picking up following three topics: (1) optical modulator array with patch antennas for weak radio-wave detection, (2) optical ring filter based on Ti-diffused LiNbO₃ waveguide loop for high efficient modulation, (3) photonic-electronic oscillator for self-oscillating optical comb generation.

Author

Electro-Optics; Modulation; Technologies; Photonics

20070002950 NASA Dryden Flight Research Center, Edwards, CA, USA

Progress with Reconfigurable Instrumentation Signal Conditioning Development

Hamory, Philip J.; Bekker, Dmitriy; 2005 Engineering Annual Report; December 2006, pp. 23-24; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002950>; Avail.: CASI: [A01](#), Hardcopy

New signal conditioning circuitry for increasing flight research productivity has been designed, fabricated, and is now undergoing laboratory testing. The new design is intended to have the same analog functionality and research-quality performance of existing designs, but with remotely adjustable gain, offset, and filter settings.

Author

Circuit Boards; Fabrication; Reconfigurable Hardware; Signal Detection; Microelectronics

20070003013 California Univ., Santa Cruz, CA USA

Thermoreflectance Imaging of Superlattice Micro Refrigerators

Christofferson, James; Vashae, Daryoosh; Shakouri, Ali; Melese, Philip; Fan, Xiaofeng; Zeng, Gehong; Labounty, Chris; Bowers, John E; Croke, Edward T; Mar 2001; 6 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458816; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458816>; Avail.: CASI: [A02](#), Hardcopy

High resolution thermal images of semiconductor micro refrigerators are presented. Using the thermoreflectance method and a high dynamic range PIN array camera, thermal images with 50mK temperature resolution and high spatial resolution

are presented. This general method can be applied to any integrated circuit, and can be used as a tool for identifying fabrication failures. With further optimization of the experimental setup, we expect to obtain thermal images with sub-micron spatial resolution.

DTIC

Imaging Techniques; Refrigerators; Superlattices; Thermal Mapping; Thermoelectric Cooling

20070003047 Army Research Lab., Adelphi, MD USA

Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna

Keller, Steven; Coburn, William; Anthony, Theodore; Patterson, Chad; Nov 2006; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458878; ARL-TR-3994; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458878>; Avail.:

CASI: A03, Hardcopy

The Method of Moments, implemented in 2.5-dimensions (2.5-D) with the multilayer Green's Function, and the Finite Element Method, a fully three-dimensional (3-D) solution of Maxwell's equations, are two popular methods for antenna simulations. Commercial software implementing these two methods was used to simulate a single aperture-coupled patch antenna element. This effort was time limited so that a simple antenna was selected for which the antenna design, fabrication, and measurements could be accomplished in less than three months. The simulation results are compared with experimental data measured for an antenna prototype that has substrate and ground plane dimensions of 4 inches by 4 inches. The microstrip feed line extends to the edge of the substrate where a coaxial connector is installed between the microstrip and slotted ground plane and there is no bottom ground plane. The results are used to compare and contrast the use of these two approaches for the design and simulation of an aperture-coupled patch antenna with finite size substrate and ground plane.

DTIC

Antennas; Apertures; C Band; Coupled Modes; Microwave Antennas; Patch Antennas; Simulation

20070003070 Space and Naval Warfare Systems Command, San Diego, CA USA

Safety Core Insulator Failures Reliability Analysis

Hansen, P M; Oct 2006; 21 pp.; In English

Report No.(s): AD-A458910; TR-1951; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458910>; Avail.:

CASI: A03, Hardcopy

This report describes reliability analysis of safety core insulators. Known incidents (Navy and non-Navy installations) of safety core insulator failure since 1970 were identified and categorized, and mean time between failure estimated. In general, safety core insulators were determined to be extremely reliable. However, it was found that reliability at one Navy installation (Cutler, ME) was poor due to the different configuration of the Cutler antenna and insulator, combined with the occurrence of large lightning strikes in that area. The report analyzes the failures at Cutler and provides recommendations to mitigate these failures.

DTIC

Antennas; Failure; Insulators; Reliability; Reliability Analysis; Safety

20070003165 University of Southern California, Los Angeles, CA USA

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation

Huang, Hesu; Kyriakakis, Chris; Jan 2006; 5 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046; EEC-9529152

Report No.(s): AD-A459064; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459064>; Avail.:

CASI: A01, Hardcopy

Acoustic Echo Cancellation (AEC) often involves adaptive filters with large numbers of taps, which results in poor performance in real-time applications. The utilization of Delayless Subband Adaptive Filter (DSAF) helps reduce computations and improve the overall performance. However, conventional oversampled subband adaptive filters mainly use DFT or GDFT based analysis/synthesis filter banks and generate 'complex-valued' subband signals. This is particularly inefficient when applying the Affine Projection Algorithm (APA), a popular adaptive algorithm for AEC problem, to each subband. For APA implementation, real-valued signals show higher efficiency than complex signals. In this paper, we present a real-valued delayless subband APA and study both its computational complexity and performance on AEC problems.

Compared to the complex valued approach, our method achieves a better performance with lower computational cost.
DTIC

Acoustics; Adaptive Filters; Algorithms; Cancellation; Discrete Functions; Fourier Transformation; Sidebands; Signal Processing; Sound Waves

20070003169 Washington Univ., Seattle, WA USA

HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks

Lazos, Loukas; Poovendran, Radha; Jan 2005; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-2-0011; N00014-04-1-0479

Report No.(s): AD-A459069; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459069>; Avail.: CASI: A03,
Hardcopy

In this paper we address the problem of robustly estimating the position of randomly deployed nodes of a Wireless Sensor Network (WSN), in the presence of security threats. We propose a range-independent localization algorithm called HiRLoc, that allows sensors to passively determine their location with high resolution, without increasing the number of reference points, or the complexity of the hardware of each reference point. In HiRLoc, sensors determine their location based on the intersection of the areas covered by the beacons transmitted by multiple reference points. By combining the communication range constraints imposed by the physical medium with computationally efficient cryptographic primitives that secure the beacon transmissions, we show that HiRLoc is robust against known attacks on WSN, such as the wormhole attack, the Sybil attack and compromise of network entities. Finally, our performance evaluation shows that HiRLoc leads to a significant improvement in localization accuracy compared to state-of-the-art range-independent localization schemes, while requiring fewer reference points.

DTIC

Algorithms; Detectors; High Resolution; Maximum Likelihood Estimates; Position (Location)

20070003183 Naval Undersea Warfare Center, Newport, RI USA

Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array

Freitag, Lee; Grund, Mathew; Catipovic, Josko; Nagle, Daniel; Pazol, Brian; Glynn, James; Jan 2001; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459089; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459089>; Avail.: CASI: A02,
Hardcopy

A new conformal array designed to enhance acoustic communication on small unmanned underwater vehicles (UUVs) is presented. The array is intended to improve the reliability and rate of acoustic communication to UUVs under conditions of multipath, multiuser interference, broadband or narrowband jamming and low signal-to-noise ratio. The array elements are constructed from a piezocomposite material that can be injection molded to nearly any shape, including into curves that match the hull radius of the vehicle. The array is encapsulated into a low-profile assembly 0.02 m thick and bonded directly to the hull of a REMUS vehicle. The frequency response and beampatterns rectly to the pressure vessel.

DTIC

Acoustics; Communication; Hulls (Structures); Sound Transmission; Underwater Vehicles

20070003188 Naval Research Lab., Washington, DC USA

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments

Howarth, Thomas R; Tressler, James F; Jan 2000; 9 pp.; In English

Report No.(s): AD-A459095; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459095>; Avail.: CASI: A02,
Hardcopy

Miniature flexensional transducers, called cymbals, have been incorporated into thin, lightweight, large area panels for use as low frequency acoustic projectors in shallow water. The prototype panels, measuring 100-mm by 100-mm by 6.35-mm thick exhibit a high acoustic output at a relatively low in-water resonance frequency. Furthermore a second resonance frequency that is over an order of magnitude higher suggests that the panel may be used to provide sound output over almost a two decade frequency band. The mass of the unpotted panel is less than 150 grams and the total thickness is 6.35 mm. The cymbal panels are believed to be excellent candidates as acoustic projectors on autonomous and/or unmanned underwater vehicle platforms as well as other shallow water platforms where low frequency, light weight and high acoustic output are desired.

DTIC

Low Frequencies; Shallow Water; Sonar; Sound Generators; Transducers; Underwater Acoustics

20070003189 Naval Research Lab., Washington, DC USA

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application

Howarth, Thomas R; Apr 1998; 11 pp.; In English

Report No.(s): AD-A459096; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459096>; Avail.: CASI: A03, Hardcopy

Possibilities for increased mine detection and classification techniques have established a need for broadband, underwater acoustic projectors. An advanced version of a low frequency synthetic aperture sonar (SAS) for the mine reconnaissance hunter program has recently been developed, The transducer is resonant at 100 kHz but has been designed to deliver constant high sound pressure levels over an operating frequency range of 10 kHz to 100 kHz. This wide band operation is accomplished because of an absence of spurious modes within the operational frequency decade. The actual projector is constructed with a two layered 1%3 piezocomposite material stacked in mechanical series and electrically wired in parallel. This arrangement was selected in order to maximize the source level output The center electrode of the monolithic 1-3 piezocomposite layers has been segmented to offer four individual elements such that combinations of the sectors offer the ability to access nine different apertures. A constant source level is maintained through the use of a preshaped transformer between the driver and the projector. The combination of the transformer design with the clean spectrum response of the composite material results in an acoustic projector with constant source level.

DTIC

Broadband; Low Frequencies; Sonar; Sound Generators; Synthetic Apertures; Transducers; Underwater Acoustics

20070003192 Michigan Univ., Ann Arbor, MI USA

Boost Logic: A High Speed Energy Recovery Circuit Family

Jan 2005; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0122

Report No.(s): AD-A459103; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459103>; Avail.: CASI: A03, Hardcopy

In this paper, we propose Boost Logic, a logic family which relies on voltage scaling, gate overdrive and energy recovery techniques to achieve high energy efficiency at frequencies in the GHz range. The key feature of our design is the use of an energy recovering boost stage to provide an efficient gate overdrive to a highly voltage scaled logic at near threshold supply voltage. We have evaluated our logic family using post-layout simulation of an 8-bit pipelined array multiplier in a 0.13 micron CMOS process with $V_{th}=340mV$. At 1.6GHz and a 1.3V supply voltage, the Boost multiplier dissipates 8.11pJ per computation. Comparing results from post-layout simulations of boost and voltage-scaled conventional multipliers, our proposed logic achieves 68% energy savings with respect to static CMOS. Using low V_{th} devices, Boost Logic has been verified to operate at 2GHz with a 1.25V voltage supply and 8.5pJ energy dissipation per cycle.

DTIC

Circuits; High Speed

20070003195 Optical Sciences Corp., Huntsville, AL USA

Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command

Beasley, D B; Saylor, Daniel A; Jan 2000; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAH01-98-C-R090; DAAH01-99-C-R076

Report No.(s): AD-A459107; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459107>; Avail.: CASI: A03, Hardcopy

This paper describes the recent addition characterization and integration of emerging technologies for dynamic infrared scene projection at the US Army Aviation and Missile Commands (AMCOM) Advanced Simulation Center (ASC). Infrared scene projection performs a vital role in the daily testing of tactical and theatre missile systems within these Hardware-in-the-Loop (HWIL) laboratories. Topics covered within this paper include the addition and characterization of new Honeywell and Santa Barbara Infrared emitter arrays. a five-axis flight motion table test configuration. unique calibration/NUC schemes. added software support, verification/validation results and supplemental projection systems. A new dynamic IR scene projector technology based upon the Digital Micromirror Device™ is also presented in the paper as well as example imagery from several of the projector systems.

DTIC

Infrared Imagery; Missiles; Projectors

20070003196 Army Aviation and Missile Command, Redstone Arsenal, AL USA

Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command

Saylor, Daniel A; Beasley, D B; Braselton, Bill; Buford, Jim; Jan 2001; 12 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459108; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459108>; Avail.: CASI: A03,
Hardcopy

This paper describes the recent addition, characterization, and integration of emerging technologies for dynamic infrared scene projection at the US Army Aviation and Missile Command's (AMCOM) Advanced Simulation Center (ASC). Infrared scene projection performs a vital role in the daily testing of tactical and theatre missile systems within these Hardware-in-the-Loop (HWIL) laboratories. Topics covered within this paper include the addition and characterization of new Honeywell and Santa Barbara Infrared emitter arrays, the integration and operation of the Honeywell and SBIR emitter array systems into a HWIL test, the development of high speed reduced-size IRSP drive electronics, the development of a NUC/characterization station, added software support, and the status of DMD-based infrared scene projector. Example imagery and test results from several of the projector systems are included within this paper.

DTIC

Infrared Radiation; Missiles

20070003223 University of Southern California, Marina del Rey, CA USA

Display Research at the University of Southern California

Bolas, Mark; Pair, Jarrell; Haynes, Kip; McDowall, Ian; Jan 2006; 5 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-99-D-0046; N00014-03-C-0481
Report No.(s): AD-A459171; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459171>; Avail.: CASI: A01,
Hardcopy

The University of Southern California and its collaborative research partner, Fakespace Labs, are participating in a number of research programs to invent and implement new forms of display technologies for immersive and semi-immersive applications. This paper briefly describes three of these technologies and highlights a few emerging results from those efforts. The first system is a rear projected 300 degree field of view cylindrical display. It is driven by 11 projectors with geometry correction and edge blending hardware. A full scale prototype will be completed in March 2006. The second system is a 14 screen projected panoramic room environment used as an advanced teaching and meeting space. It can be driven by a cluster of personal computers or low-cost DVD players, or driven by a single personal computer. The third is a prototype stereoscopic head mounted display that can be worn in a fashion similar to standard dust protection goggles. It provides a field of view in excess of 150 degrees.

DTIC

Display Devices; Universities

20070003264 Nebraska Univ., Lincoln, NE USA

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles

Lu, Yongfeng; Sep 2006; 32 pp.; In English
Contract(s)/Grant(s): F49620-03-1-0426; Proj-2305
Report No.(s): AD-A459254; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459254>; Avail.: CASI: A03,
Hardcopy

The fabrications of periodic dielectric structures at nanoscales, which are called photonic bandgap (PBG) structures, have attracted the interests of researchers due to the applications in a variety of fields such as optoelectronics, photonics, sensors, photo catalysts, and energy harvesting coatings. One- and two-dimensional PBG structures have been realized because such systems are very amenable to conventional fabrication techniques. However, three-dimensional (3-D) PBG structures are still remained as an important and motivating challenge. This project aimed at the fabrication of 3-D PBG structures with laser-assisted processing techniques. Theoretical simulation and experimental measurements for optical properties of PBG structures were also carried out. The morphologies, material properties, and optical properties of the PBG structures were characterized using scanning electron microscopy (SEM), Raman spectroscopy (RS), and spectroscopic ellipsometry (SE). It has been proved that 3-D PBG structures with expected optical properties can be obtained using laser-assisted processing techniques.

DTIC

Energy Gaps (Solid State); Fabrication; Laser Applications; Lasers; Nanoparticles; Nanostructures (Devices); Optical Properties; Photonics; Substrates

20070003274 Naval Research Lab., Washington, DC USA

Actuator Trade-Off Analysis for DARPA/BOSS Prototype II

Stroman, Richard O; Dec 13, 2006; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459266; NRL/MR/6110--06-9009; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459266>;
Avail.: CASI: [A03](#), Hardcopy

The servomotor actuation method used in the first flight prototype zoom lens was chosen because it is simple, small, lightweight, easily available, and can be rapidly integrated into existing UAV systems. Unfortunately, it has proven to be unsatisfactory in several ways. Commanding the servo to positions outside of its displacement-force envelope results in the PID controller 'hunting' for the commanded position and burning out the motor. The gearing system linking the servo and plunger is rudimentary and does not allow for much precision in positioning, despite the digital control used in recent versions of the prototype. The form factor of the servo requires it to be placed outside of the optical assembly and complicates the mechanical interface of actuation components. Finally, because model aircraft hobbyists are the main market for these servos, rather than the research or manufacturing communities, very little technical information on the construction or operation of them can be obtained from the manufacturer. An actuator trade-off analysis was undertaken to identify actuation technologies that may better suit our objectives in the next prototype (Prototype II).

DTIC

Actuators; Prototypes; Tradeoffs

20070003283 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Low-Profile Radiators in Non-Periodic Wideband Arrays

Bernhard, Jennifer T; Kerby, Kiersten C; Mayes, Paul E; Michielssen, Eric; Cung, Garvin; Nov 22, 2006; 28 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0398

Report No.(s): AD-A459277; 44493-EL.2; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459277>; Avail.: CASI: [A03](#), Hardcopy

This report details our research progress during the course of this grant. This report includes development of new wideband antenna elements, strategies for cost-effective random arrays using these elements, and supporting computational codes. First, a summary of the development and analysis of the new antenna element developed under this project is provided. Measured and simulated results show that this new element can provide a 3:1 bandwidth (using VSWR = 3 as the bandwidth criteria typically used for wideband elements) with no degradation in radiation characteristics. Next, the results of our work on arrays of random subarrays are presented. Theoretical analyses show that rotating subarrays composed of random arrays can deliver performance close to that of a purely random array while making the array more cost effective and price competitive with alternatives that work over much smaller bandwidths. Parallel work on computational tools that enable wideband simulation of elements in random arrays is also discussed. Conclusions about this research and possible directions for future research are provided along with a listing of the publications sponsored by this project to date.

DTIC

Antenna Radiation Patterns; Antennas; Broadband

20070003300 Columbia Univ., New York, NY USA

MBE Deposition of Epitaxial Fe_{1-x}V_x Films for Low-Loss Ghz Devices; Atomic-Scale Engineering of Magnetic Dynamics

Bailey, William; Aug 18, 2006; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0375; W911NF0410168

Report No.(s): AD-A459301; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459301>; Avail.: CASI: [A02](#), Hardcopy

We report on the deposition of epitaxial iron and iron alloy thin films with the lowest GHz linewidths ever attained in metallic ferromagnets. Maximum half-power Q is shown of 100 at 10 Ghz and 140 at 40 Ghz, significantly higher than known previously for metals.

DTIC

Atoms; Deposition; Epitaxy; Ferromagnetic Materials; Molecular Beam Epitaxy; Thin Films

20070003304 Oregon Univ., Eugene, OR USA

Electromagnetically Induced Transparency in Semiconductors

Wang, Hailin; Jun 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0137

Report No.(s): AD-A459306; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459306>; Avail.: CASI: A03, Hardcopy

This final technical report summarizes research supported by ARO in two areas: electromagnetically induced transparency (EIT) from electron spin coherence and cavity QED with nitrogen vacancy (NV) centers in diamond nanocrystals. We have developed three different schemes to realize EIT using electron spin coherence in semiconductor quantum wells. The three schemes include the use of V-type three-level systems via heavy hole excitonic transitions in an external magnetic field in the Voigt geometry, the use of V-type three-level systems via light hole excitonic transitions in a waveguide geometry and in the absence of an external magnetic field, and the use of a lambda-type three-level system in a mixed-type quantum well structure. We have achieved the breakthrough of realizing the strong coupling regime in cavity QED by coupling NV centers in diamond nanocrystals to whispering gallery modes in a deformed fused silica microsphere. In addition, our improved understanding on how electron spin coherence contributes to nonlinear optical processes in semiconductors has also led to the demonstration of a spin manipulation scheme that controls both the amplitude and phase of electron spin precessions.

DTIC

Electromagnetism; Nitrogen; Quantum Wells; Semiconductors (Materials)

20070003348 University of Southern California, Los Angeles, CA USA

Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures

Tanguay, Jr , Armand R; Jenkins, B K; von der Malsburg, Christoph; Mel, Bartlett; Biederman, Irving; O'Brien, John; Madhukar, Anupam; Nov 13, 2006; 126 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAG55-98-1-0293

Report No.(s): AD-A459423; USC-OMDL-01-MURI-FINAL; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459423>; Avail.: CASI: A07, Hardcopy

The goal of this research program was to develop novel algorithms, architectures, and hardware for a truly smart camera, with inherent capability for semi-autonomous object recognition as well as optimal image capture. In this research, we combined striking advances in the understanding of the mechanisms of biological vision systems with similar advances in hybrid electronic/photonic packaging technology, in order to develop adaptive, artificial, biologically-inspired vision systems. A key research program objective, therefore, was to establish and address the fundamental scientific and technological issues that currently inhibit the implementation of such adaptive optoelectronic eyes.

DTIC

Algorithms; Architecture (Computers); Biomimetics; Cameras; Electro-Optics

20070003359 Vanderbilt Univ., Nashville, TN USA

Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications

Qi, Jinbo; Xu, Ying; Tolk, Norman; Nov 29, 2006; 5 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0436

Report No.(s): AD-A459452; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459452>; Avail.: CASI: A01, Hardcopy

In this report, we present our observation of optically excited nonequilibrium spin dynamics in (Ga,Mn)As at room temperature. Our observation demonstrates two different regimes: 1) an initial ultrafast oscillatory behavior during the subpicosecond and picosecond time scale after photo-excitation, which we find to be related to photo-induced carrier (electrons and holes) spins; 2) a slow demagnetization over hundreds of picoseconds, which, we believe, results from not only strong-coupled hole-Mn spins but also interactions between electron spins and Mn moments.

DTIC

Injection; Magnetization; Quantum Wells; Semiconductors (Materials); Sensitivity

20070003360 California Univ., Santa Cruz, CA USA

Directional Collision Avoidance in Ad Hoc Networks

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2004; 15 pp.; In English

Contract(s)/Grant(s): DAAD19-01-C-0026; F49620-00-1-0330

Report No.(s): AD-A459458; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459458>; Avail.: CASI: A03, Hardcopy

This paper analyzes the performance of directional collision avoidance schemes, in which antenna systems are used to direct the transmission and reception of control and data packets in channel access protocols based on four-way handshakes to try to avoid collisions. The first analytical model to consider directional reception and the possible difference in gain between omni-directional and directional transmissions is presented. Analytical results show that, when the directional collision avoidance scheme in which all transmissions are directional is augmented with directional receiving, one-hop throughput does not decrease due to the increased spatial reuse, even when the number of competing nodes within a region increases. It is also shown that, as expected, the performance of directional collision avoidance schemes degrades when directional transmissions have much higher gain than omni-directional transmissions. However, this degradation is relatively small. Simulations of the IEEE 802.11 protocol and its directional variants validate the results predicted in the analysis. The simulation results also show that the presence of broadcast traffic does not degrade the performance of the all-directional collision avoidance scheme significantly, even for relatively large percentages of broadcast traffic. The performance results of this study indicate that the most attractive collision avoidance approach consists of using directional transmissions of control and data packets, together with the directional reception of packets whenever a node is expecting a particular packet. Given the high tolerance to broadcast traffic of directional collision avoidance schemes, it is argued that the periodic transmission of beacons omni-directionally suffices to provide such schemes with the relative location of neighboring nodes.

DTIC

Collision Avoidance; Directional Antennas

20070003442 Department of the Navy, Washington, DC USA

Low Voltage Piezoelectric Composite for Transducer Applications

Benjamin, Kim C, Inventor; Feb 25, 2005; 15 pp.; In English

Report No.(s): AD-D020267; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020267>; Avail.: CASI: A03, Hardcopy

This invention generally relates to an acoustic transducer's electromechanical substrate. More particularly, the invention relates to a piezoelectric polymer composite substrate enabling an array of transducers capable of being used with lower voltage than prior art transducers. A piezoelectric ceramic polymer composite is provided with piezoelectric ceramic pillars having intermediate electrodes. These intermediate electrodes reduce the voltage necessary to achieve a given polarizing electric field within the piezoelectric ceramic pillars. Upper and lower electrodes are provided on the surfaces of the composite substrate. These electrodes are electrically joined to the intermediate electrodes by insulated electrical traces. The piezoelectric ceramic phase geometry may include either 1-3 (rods) or 2-2 (bars) connectivity. The number of electrode pairs is limited only by the fabrication process. The lateral distribution of these piezoelectric pillars is decoupled using a polymer backfill material. Upper and lower electrodes can be partitioned to form an array of transducer elements.

DTIC

Inventions; Low Voltage; Patent Applications; Piezoelectric Transducers; Piezoelectricity; Polymers; Transducers

20070003444 Department of the Navy, Washington, DC USA

Miniature Low Frequency Acoustic Transmitter

Ruffa, Anthony A, Inventor; Jun 26, 2006; 14 pp.; In English

Report No.(s): AD-D020269; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020269>; Avail.: CASI: A03, Hardcopy

A miniature lightweight transmitter that mechanically generates low-frequency acoustic energy is described, wherein one or more miniature balloons filled with air are positioned at the center of a pressure vessel filled with water and tethered in place. The system is then driven into resonance by using transducers that directly drive the wall of the pressure vessel or by using a piston to drive fluid into and out of the pressure vessel.

DTIC

Low Frequencies; Miniaturization; Patent Applications; Transmitters

20070003446 Naval Undersea Warfare Center, Newport, RI USA

A Flexible Cymbal Array

Benjamin, Kim C, Inventor; Dec 4, 2006; 16 pp.; In English

Report No.(s): AD-D020271; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020271>; Avail.: CASI: A03, Hardcopy

There is thus a need for cymbal arrays which are sufficiently flexible to be mounted onto the curved hulls of underwater vehicles. It is further required that such arrays be sufficiently flexible to be conformed to surfaces exhibiting complex curves, such as bow or nose cone surfaces, which curve around the axis of the UUV and also curve from the outer portion of the hull to the axis of the hull at the center of the nose cone. An object of the invention is, therefore, to provide a cymbal array for mounting on curved hull portions of underwater vehicles.

DTIC

Acoustic Measurement; Arrays; Hulls (Structures); Patent Applications; Piezoelectric Transducers; Underwater Vehicles

20070003447 Naval Undersea Warfare Center, Newport, RI USA

Three-Dimensional Display Assembly

Amidon, Charles P, Inventor; Nov 4, 2006; 16 pp.; In English

Report No.(s): AD-D020272; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020272>; Avail.: CASI: A03, Hardcopy

An object of the invention is to provide an image display assembly which displays imagery in three dimensions without requiring special glasses or similar gear for an observer, and which displays images of objects with minimal display of hidden surfaces. A further object of the invention is to provide such an assembly as facilitates viewing of the image from any direction surrounding the image.

DTIC

Color; Display Devices; Patent Applications

20070003483 NASA Ames Research Center, Moffett Field, CA, USA

Computational Nanoelectronics and Nanotechnology at NASA ARC

Saini, Subhash; [1998]; 1 pp.; In English; Mardi Gras conference on Materials and Microsystems for Extreme Environments: Experimental and Computational Challenges, 19 - 21 Feb. 1998, Baton Rouge, Louisiana, USA

Contract(s)/Grant(s): RTOP# 519-40-12; No Copyright; Avail.: Other Sources; Abstract Only

Both physical and economic considerations indicate that the scaling era of CMOS will run out of steam around the year 2010. However, physical laws also indicate that it is possible to compute at a rate of a billion times present speeds with the expenditure of only one Watt of electrical power. NASA has long-term needs where ultra-small semiconductor devices are needed for critical applications: high performance, low power, compact computers for intelligent autonomous vehicles and Petaflop computing technology are some key examples. To advance the design, development, and production of future generation micro- and nano-devices, IT Modeling and Simulation Group has been started at NASA Ames with a goal to develop an integrated simulation environment that addresses problems related to nanoelectronics and molecular nanotechnology. Overview of nanoelectronics and nanotechnology research activities being carried out at Ames Research Center will be presented. We will also present the vision and the research objectives of the IT Modeling and Simulation Group including the applications of nanoelectronic based devices relevant to NASA missions.

Author

Nanotechnology; Semiconductor Devices; Electronics; NASA Programs; Computation

34

FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

20070002525 NASA Ames Research Center, Moffett Field, CA, USA

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species

Fletcher, Douglas G.; 1997; 1 pp.; In English; Gordon Research Conference on the Physics and Chemistry of Laser Diagnostics in Combustion, July 6-11, 1997, Plymouth, NH, USA

Contract(s)/Grant(s): RTOP 242-33-01; No Copyright; Avail.: Other Sources; Abstract Only

Flow property measurements that were recently acquired in the Ames Research Center Aerodynamic Heating Facility (AHF) arc jet using two-photon Laser-Induced Fluorescence (LIF) of atomic nitrogen and oxygen are reported. The measured properties, which include velocity, translational temperature, and species concentration, cover a wide range of facility operation for the 30 cm nozzle. During the tests, the arc jet pressure and input stream composition were maintained at fixed values and the arc current was varied to vary the flow enthalpy. As part of this ongoing effort, a measurement of the two-photon absorption coefficient for the $3p4D \rightarrow 2p4S$ transition of atomic nitrogen was performed, and the measured value is used to convert the relative concentration measurements to absolute values. A flow reactor is used to provide a known temperature line shape profile to deconvolve the laser line width contribution to the translational temperature measurements. Results from the current experiments are compared with previous results obtained using NO-Beta line profiles at room temperature and the problem of multimode laser oscillation and its impact on the two-photon excitation line shape are discussed. One figure is attached, and this figure shows relative N atom concentration measurements as a function of the arc power. Other measurements have already been acquired and analyzed. This poster represents an application of laser-spectroscopic measurements in an important test facility. The arc jet flow facilities are heavily used in thermal protection material development and evaluation. All hypersonic flight and planetary atmospheric entry vehicles will use materials tested in these arc jet facilities.

Author

Aerodynamic Heating; Flow Measurement; Temperature Measurement; Laser Induced Fluorescence; Flow Characteristics; Thermal Protection; Jet Flow

20070002628 Los Alamos National Lab., NM USA

Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications

Sinha, N. N.; Kaduchak, G.; Sinha, D. N.; Adcock, P. A.; 5 Oct 04; 16 pp.; In English

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

Patent Info.: Filed 5 Oct 04; US-Patent-Appl-SN-10-958-886

Report No.(s): PB2007-103804; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The present invention includes an apparatus and corresponding method for fluid flow control in microfluidic applications. A microchamber, filled with a fluid, is in fluid contact with a flexible plate. A transducer is acoustically coupled to the flexible plate. A function generator outputs a signal to excite the transducer, which in turn induces drumhead vibration of the flexible plate, creating a flow pattern within the fluid filled microchamber.

NTIS

Microfluidic Devices; Patent Applications

20070002702 NASA Glenn Research Center, Cleveland, OH, USA

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators

Samimy, M.; Kastner, J.; Kim, J.-H.; Utkin, Y.; Adamovich, I.; Brown, C. A.; December 2006; 29 pp.; In English; Third Flow Control Conference, 5-8 Jun. 2006, San Francisco, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): NCC3-1086; WBS 754.02.07.03.04.02

Report No.(s): NASA/TM-2006-214367; E-15645; AIAA Paper 2006-2846; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002702>; Avail.: CASI: [A03](#), Hardcopy

The idea of manipulating flow to change its characteristics is over a century old. Manipulating instabilities of a jet to increase its mixing and to reduce its radiated noise started in the 1970s. While the effort has been successful in low-speed and low Reynolds number jets, available actuators capabilities in terms of their amplitude, bandwidth, and phasing have fallen short in control of high-speed and high Reynolds number jets of practical interest. Localized arc filament plasma actuators have recently been developed and extensively used at Gas Dynamics and Turbulence Laboratory (GDTL) for control of highspeed and high Reynolds number jets. While the technique has been quite successful and is very promising, all the work up to this point had been carried out using small high subsonic and low supersonic jets from a 2.54 cm diameter nozzle exit with a Reynolds number of about a million. The preliminary work reported in this paper is a first attempt to evaluate the scalability of the technique. The power supply/plasma generator was designed and built in-house at GDTL to operate 8 actuators simultaneously over a large frequency range (0 to 200 kHz) with independent control over phase and duty cycle of each actuator. This allowed forcing the small jet at GDTL with azimuthal modes $m = 0, 1, 2, 3$, plus or minus 1, plus or minus 2, and plus or minus 4 over a large range of frequencies. This power supply was taken to and used, with minor modifications, at the NASA Nozzle Acoustic Test Rig (NATR). At NATR, 32 actuators were distributed around the 7.5 in. nozzle (a linear increase with nozzle exit diameter would require 60 actuators). With this arrangement only 8 actuators could operate simultaneously, thus limiting the forcing of the jet at NATR to only three azimuthal modes $m =$ plus or minus 1, 4, and 8. Very

preliminary results at NATR indicate that the trends observed in the larger NASA facility in terms of the effects of actuation frequency and azimuthal modes are similar in both small GDTL and larger NASA jets. However, the actuation authority seems to fall short in the larger jet at higher Mach numbers, resulting in decreased amplitude response compared to the small jet, which is attributed at this point to the lack of sufficient number of actuators. The preliminary results seem also to suggest that amplitude of actuation tones is similar in both the small and larger jets.

Author

Actuators; High Reynolds Number; Plasma Generators; Aeroacoustics; Flow Regulators; High Speed; Gas Dynamics

20070002703 NASA Glenn Research Center, Cleveland, OH, USA

Turbulent Chemical Interaction Models in NCC: Comparison

Norris, Andrew T.; Liu, Nan-Suey; December 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NCC3-1029; WBS 754.02.07.03.06.01

Report No.(s): NASA/TM-2006-214417; E-15697; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002703>;

Avail.: CASI: A03, Hardcopy

The performance of a scalar PDF hydrogen-air combustion model in predicting a complex reacting flow is evaluated. In addition the results are compared to those obtained by running the same case with the so-called laminar chemistry model and also a new model based on the concept of mapping partially stirred reactor data onto perfectly stirred reactor data. The results show that the scalar PDF model produces significantly different results from the other two models, and at a significantly higher computational cost.

Author

Mathematical Models; Flow Distribution; Turbulence; Combustion Chemistry

20070002704 NASA Glenn Research Center, Cleveland, OH, USA

Summary of Stirling Converter Testing at NASA Glenn Research Center

Schreiber, Jeffrey G.; December 2006; 21 pp.; In English; 4th International Energy Conversion Engineering Conference (IECEC-2006), 26-29 Jun. 2006, San Diego, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 494.04.01.01

Report No.(s): NASA/TM-2006-214429; E-15706; AIAA Paper 2006-4061; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002704>; Avail.: CASI: A03, Hardcopy

The NASA Glenn Research Center (GRC) has been testing free-piston Stirling converters for potential use in radioisotope power systems. These converters tend to be in the 35 to 80 W electric power output range. Tests at GRC have accumulated over 80,000 hr of operation. Test articles have been received from Infinia Corporation of Kennewick, Washington and from Sunpower of Athens, Ohio. Infinia designed and built the developmental Stirling Technology Demonstration Convertors (TDC) in addition to the more advanced Test Bed and Engineering Unit convertors. GRC has eight of the TDC's under test including two that operate in a thermal vacuum environment. Sunpower designed and developed the EE-35 and the Advanced Stirling Converter (ASC). GRC has six of the EE-35s and is preparing for testing multiple ASCs. Free-piston Stirling converters for radioisotope power systems make use of non-contacting operation that eliminates wear and is suited for long-term operation. Space missions with radioisotope power systems are often considered that extend from three to 14 years. One of the key capabilities of the GRC test facility is the ability to support continuous, unattended operation. Hardware, software, and procedures for preparing the test articles were developed to support these tests. These included the processing of the converters for minimizing the contaminants in the working fluid, developing a helium charging system for filling and for gas sample analysis, and the development of new control software and a high-speed protection circuit to insure safe, round-the-clock operation. Performance data of Stirling converters over time is required to demonstrate that a radioisotope power system is capable of providing reliable power for multi-year missions. This paper will discuss the status of Stirling converter testing at GRC.

Author

Stirling Cycle; Free-Piston Engines; Test Stands; Converters; Technology Utilization

20070003054 Massachusetts Inst. of Tech., Cambridge, MA USA

Reduced Navier-Stokes Equations Near a Flow Boundary

Kilic, M S; Jacobs, G B; Hesthaven, J S;g; Haller, G; Aug 4, 2005; 31 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0200; DMS-04-04845

Report No.(s): AD-A458888; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458888>; Avail.: CASI: A03,

Hardcopy

We derive a hierarchy of PDEs for the leading-order evolution of wall-based quantities, such as the skin-friction and the wall-pressure gradient, in two-dimensional fluid flows. The resulting Reduced Navier-Stokes (RNS) equations are defined on the boundary of the flow, and hence have reduced spatial dimensionality compared to the Navier-Stokes equations. This spatial reduction speeds up numerical computations and makes the equations attractive candidates for flow-control design. We prove that members of the RNS hierarchy are well-posed if appended with boundary-conditions obtained from wall-based sensors. We also derive the lowest-order RNS equations for three-dimensional flows. For several benchmark problems, our numerical simulations show close finite-time agreement between the solutions of RNS and those of the full Navier-Stokes equations.

DTIC

Boundaries; Navier-Stokes Equation

20070003242 Air Force Research Lab., Wright-Patterson AFB, OH USA

Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate

Gschwender, Lois J; Campo, Angie; Snyder, Carl E; Sharma, Shashi K; Jenney, Tim; Fultz, George; Apr 2006; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-3005

Report No.(s): AD-A459220; AFRL-ML-WP-TR-2006-4240; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459220>; Avail.: CASI: A03, Hardcopy

METSS Corporation, under a Small Business Innovation Research program (F33615-96-C-5074) with AFRL/MLBT, developed a hydraulic fluid candidate known as METTS HyTherm CI-2. This fluid is intended to be rust inhibited, barium free, thermally stable and fire resistant hydraulic fluid suitable for aircraft use. METSS HyTherm CI-2 would eliminate the need for a separate storage fluid for components. The currently used storage fluid is classified as hazardous waste due to the barium additives. The METTS HyTherm CI-2 fluid was contaminated with distilled water and stored in jars containing bearings and pistons in a controlled environment. Each jar was inspected once a year for three years. At the end of the storage period, the METTS HyTherm CI-2 fluid was endurance pump tested. The METSS HyTherm CI-2 fluid excelled in all storage tests as well as the pump endurance test. There was no corrosion present after three years of storage, and pump performance was comparable with the pump performance with fluid MIL-PRF-83282 used in an earlier study.

DTIC

Barium; Hydraulic Equipment; Hydraulic Fluids

20070003268 Drexel Univ., Philadelphia, PA USA

The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure

Cemansky, N P; Miller, D L; Oct 2006; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0070

Report No.(s): AD-A459259; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459259>; Avail.: CASI: A03,

Hardcopy

A research program to study the low temperature oxidation chemistry of JP-8 at high pressures has been conducted at Drexel University. The current program was initiated in June 2003 through a grant from the Army Research Office (Grant No. DAAD19-03-1-0070, Project No. 44458-EG) and was completed in July 2006. The objectives of this project were to determine the effects of fuel composition variations in JP-8 reactivity at low and intermediate temperatures (600 - 1000 K) and elevated pressures (2 - 20 atm), to develop a chemical surrogate for JP-8, and to obtain kinetic information of the JP-8 surrogate components neat and in blends. Fuels were oxidized in a pressurized flow reactor, with complimentary experiments conducted in a single cylinder research engine. Detailed kinetic information was obtained utilizing gas chromatography with flame ionization detection and coupling to a mass spectrometer. In addition, hydrocarbons similar to the JP-8 surrogate components but of lighter molecular weight were studied in detail to ascertain the fundamental branching pathways of hydrocarbons at low temperatures; several other potential surrogate components and blends, including for Fischer-Tropsch JP-8, were also examined.

DTIC

High Pressure; Ignition; JP-8 Jet Fuel; Low Temperature; Oxidation; Spontaneous Combustion

20070003443 Department of the Navy, Washington, DC USA

Mast Wake Reduction by Shaping

Beauchamp, Charles H, Inventor; Nov 3, 2005; 22 pp.; In English

Report No.(s): AD-D020268; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020268>; Avail.: CASI: A03,

Hardcopy

The present invention relates to various mast shapes, in which the mast shapes minimize the production of visible, electro-optic, infrared and radar cross section wake signatures produced by water surface piercing masts. The contribution of submarines in littoral regions has become increasingly important as modern electronic warfare support systems proliferate. While on littoral missions, submarines invariably spend a significant time at periscope depth with one or more masts deployed through the water surface. To minimize the probability of submarine detection in the littoral regions, it is critical that mast wake signatures be minimized or eliminated. A surface piercing submarine mast typically produces signatures (i.e., spray, foam and waves) that are observable by visual, electro-optic, infrared and radar means. One important parameter in wake signature reduction is thickness to chord ratio. Typically, the hydrodynamic loads and functional volume requirements on a submarine mast constrain the thickness to chord ratios in the range of 0.5-0.7. Streamlining significantly reduces a visible wake by reducing bow waves and spray. Streamlining also produces lower trailing edge angles that result in reduced vortex shedding. Reduced vortex shedding minimizes generation of and mixing of bubbles and thus reduces a visible white water wake. However, the low thickness to chord ratio foils that have smaller wakes produce high lifts at angle of attack, have high wave slap loads, reduce usable internal space and take up more space in the submarine when the foils are not erected. Above 15-20 degree angles of attack, low thicknesses to chord foils begin to separate and thus generate more white water. Circular cross-sections minimize space requirement problems and lift and wave slap loads, but produce high drag and large wake signatures.

DTIC

Beams (Supports); Inventions; Patent Applications; Shapes; Ships; Vortex Shedding; Wakes

20070003475 NASA Ames Research Center, Moffett Field, CA, USA

Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate

Rai, Man Mohan; [1997]; 1 pp.; In English; Workshop on Boundary Layer Transition, 7-10 Sep. 1997, Syracuse, NY, USA
Contract(s)/Grant(s): RTOP 505-60-00; No Copyright; Avail.: Other Sources; Abstract Only

In recent years the techniques of computational fluid dynamics (CFD) have been used to compute flows associated with geometrically complex configurations. However, success in terms of accuracy and reliability has been limited to cases where the effects of turbulence and transition could be modeled in a straightforward manner. Even in simple flows, the accurate computation of skin friction and heat transfer using existing turbulence models has proved to be a difficult task, one that has required extensive fine-tuning of the turbulence models used. In more complex flows (for example, in turbomachinery flows in which vortices and wakes impinge on airfoil surfaces causing periodic transitions from laminar to turbulent flow) the development of a model that accounts for all scales of turbulence and predicts the onset of transition is an extremely difficult task. Fortunately, current trends in computing suggest that it may be possible to perform direct simulations of turbulence and transition at moderate Reynolds numbers in some complex cases in the near future. This presentation will focus on direct simulations of transition and turbulence using high-order accurate finite-difference methods. The advantage of the finite-difference approach over spectral methods is that complex geometries can be treated in a straightforward manner. Additionally, finite-difference techniques are the prevailing methods in existing application codes. An application of accurate finite-difference methods to direct simulations of transition and turbulence in a spatially evolving boundary layer subjected to high levels of freestream turbulence will be presented.

Author

Boundary Layer Transition; Flat Plates; Direct Numerical Simulation; Computational Fluid Dynamics

20070003477 NASA Ames Research Center, Moffett Field, CA, USA

Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility

Gokcen, Tahir; Park, Chung S.; Newfield, Mark E.; Fletcher, Douglas G.; [1998]; 1 pp.; In English; 36th AIAA Aerospace Sciences Meeting and Exhibit, 12-15 Jan. 1998, Reno, NV, USA

Contract(s)/Grant(s): NAS2-14031; No Copyright; Avail.: Other Sources; Abstract Only

This paper reports computational analysis of radiation emission experiments in a high enthalpy arc-jet wind tunnel at NASA Ames Research Center. Recently, as part of ongoing arc-jet characterization work, spectroscopic radiation emission experiments have been conducted at the 20 MW NASA Ames arc-jet facility. The emission measurements were obtained from the arc-jet freestream and from a shock layer formed in front of flatfaced models. Analysis of these data is expected to provide valuable information about the thermodynamic state of the gas in the arc-jet freestream and in the shock layer as well as thermochemical equilibration processes behind the shock in arc-jet flows. Knowledge of the thermodynamic state of the gas in arc-jet test flows and especially within the shock layer is essential to interpret the heat transfer measurements such as in surface catalysis experiments. The present work is a continuation of previous work and focuses on analysis of the emission data obtained at relatively low-pressure conditions for which the arc-jet shock layer is expected to be in thermal and chemical

nonequilibrium. Building blocks of the present computational analysis are: (1) simulation of nonequilibrium expanding flow in the converging-diverging conical nozzle and supersonic jet; (2) simulation of nonequilibrium shock layer formed in front of the flat-faced cylinder model; and (3) prediction of line-of-sight radiation from the computed flowfield. For computations of the nonequilibrium flow in the conical nozzle and shock layer, multi-temperature nonequilibrium codes with the axisymmetric formulation are used. For computations of line-of-sight radiation, a nonequilibrium radiation code (NEQAIR) is used to predict emission spectra from the computed flowfield. Computed line-of-sight averaged flow properties such as vibrational and rotational temperatures, species number densities within the shock layer will be compared with those deduced from the experimental spectra. Detailed comparisons of computational and experimental spectra will also be presented.

Author

Analysis (Mathematics); Enthalpy; Thermodynamics; Wind Tunnels

20070003491 NASA Langley Research Center, Hampton, VA, USA

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel

Murphy, Kelly J.; Borg, Stephen E.; Watkins, Anthony N.; Cole, Daniel R.; Schwartz, Richard J.; [2007]; 25 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 759.07.05

Report No.(s): AIAA Paper 2007-1005; Copyright; Avail.: CASI: [A03](#), Hardcopy

As part of a strategic, multi-facility test program, subscale testing of NASA's Crew Exploration Vehicle was conducted in both legs of NASA Langley's Unitary Plan Wind Tunnel. The objectives of these tests were to generate aerodynamic and surface pressure data over a range of supersonic Mach numbers and reentry angles of attack for experimental and computational validation and aerodynamic database development. To provide initial information on boundary layer transition at supersonic test conditions, transition studies were conducted using temperature sensitive paint and infrared thermography optical techniques. To support implementation of these optical diagnostics in the Unitary Wind Tunnel, the experiment was first modeled using the Virtual Diagnostics Interface software. For reentry orientations of 140 to 170 degrees (heat shield forward), windward surface flow was entirely laminar for freestream unit Reynolds numbers equal to or less than 3 million per foot. Optical techniques showed qualitative evidence of forced transition on the windward heat shield with application of both distributed grit and discrete trip dots. Longitudinal static force and moment data showed the largest differences with Mach number and angle of attack variations. Differences associated with Reynolds number variation and/or laminar versus turbulent flow on the heat shield were very small. Static surface pressure data supported the aforementioned trends with Mach number, Reynolds number, and angle of attack.

Author

Angle of Attack; Heat Shielding; Mach Number; Reynolds Number; Supersonic Speed; Wind Tunnel Tests; Crew Exploration Vehicle

20070003496 NASA Langley Research Center, Hampton, VA, USA

Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh

Scianfani, Anthony J.; Vassberg, John C.; Harrison, Neal A.; DeHaan, Mark A.; Rumsey, Christopher L.; Rivers, S. Melissa; Morrison, Joseph H.; January 11, 2007; 40 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA

Report No.(s): AIAA Paper 2007-257; Copyright; Avail.: CASI: [A03](#), Hardcopy

A series of overset grids was generated in response to the 3rd AIAA CFD Drag Prediction Workshop (DPW-III) which preceded the 25th Applied Aerodynamics Conference in June 2006. DPW-III focused on accurate drag prediction for wing/body and wing-alone configurations. The grid series built for each configuration consists of a coarse, medium, fine, and extra-fine mesh. The medium mesh is first constructed using the current state of best practices for overset grid generation. The medium mesh is then coarsened and enhanced by applying a factor of 1.5 to each (I,J,K) dimension. The resulting set of parametrically equivalent grids increase in size by a factor of roughly 3.5 from one level to the next denser level. CFD simulations were performed on the overset grids using two different RANS flow solvers: CFL3D and OVERFLOW. The results were post-processed using Richardson extrapolation to approximate grid converged values of lift, drag, pitching moment, and angle-of-attack at the design condition. This technique appears to work well if the solution does not contain large regions of separated flow (similar to that seen in the DLR-F6 results) and appropriate grid densities are selected. The extra-fine grid data helped to establish asymptotic grid convergence for both the OVERFLOW FX2B wing/body results and the OVERFLOW DPW-W1/W2 wing-alone results. More CFL3D data is needed to establish grid convergence trends. The medium grid was utilized beyond the grid convergence study by running each configuration at several angles-of-attack so drag

polars and lift/pitching moment curves could be evaluated. The alpha sweep results are used to compare data across configurations as well as across flow solvers. With the exception of the wing/body drag polar, the two codes compare well qualitatively showing consistent incremental trends and similar wing pressure comparisons.

Author

Aerodynamic Drag; Body-Wing Configurations; Computational Fluid Dynamics; Grid Generation (Mathematics); Aircraft Design

35

INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

20070003226 University of Southern California, Marina del Rey, CA USA

Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems

Pair, Jarrell; Treskunov, Anton; Piepol, Diane; Jan 2005; 3 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459175; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459175>; Avail.: CASI: A01, Hardcopy

Over the past four years, the FlatWorld project [1] at the University of Southern California Institute for Creative Technologies has exploited ad hoc immersive display techniques to prototype virtual reality education and training applications. While our approach is related to traditional immersive projection systems such as the CAVE [2], our work draws extensively upon techniques widely used in Hollywood sets and theme parks. Our first display system, initially prototyped in 2001, enables wide area virtual environments in which participants can maneuver through simulated rooms, buildings, or streets. In 2004, we expanded our work by experimenting with transparent projection screens. To date, we have used this display technique for presenting life size interactive characters with a pseudo-holographic appearance.

DTIC

Display Devices; Virtual Reality

20070003247 Army Tank-Automotive and Armaments Command, Warren, MI USA

Multiband Imagery for Concealed Weapon Detection

Meitzler, Thomas; Sohn, E J; Lane, Kimberly; Bryk, Darryl; Jan 2003; 9 pp.; In English

Report No.(s): AD-A459232; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459232>; Avail.: CASI: A02, Hardcopy

The fusion of visual and infrared sensor imagery for the detection of concealed weapons is demonstrated using several techniques. The fusion algorithms used are wavelet based fusion and Fuzzy Logic Approach (FLA) fusion. The FLA is presented as one of several possible methods for combining images from different sensors for achieving an image that displays more information than either image separately. Near infrared filters are used along with camcorders to capture images for later fusion. Metrics are suggested that could rate the fidelity of the fused images, such as, a textured clutter metric and entropy.

DTIC

Imagery; Infrared Detectors

20070003259 Massachusetts Inst. of Tech., Cambridge, MA USA

Design of Optical Matched Filters

Humblet, Pierre A; Mar 1991; 17 pp.; In English

Contract(s)/Grant(s): F19628-90-C-0002; NCR-8802991

Report No.(s): AD-A459249; LIDS-P-2029; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459249>; Avail.: CASI: A03, Hardcopy

This paper studies the design and the performance of receivers using optical matched filters and direct detection, when the basic pulse shape consists a rectangular pulse of monochromatic light. The modulation format can be ASK, FSK or DPSK. Such receivers are useful when amplifier noise is the main source of uncertainty as they optimally reject additive white

Gaussian noise. The performances of ASK and FSK receivers are reported, taking into account shot noise and the effects of post detection filtering.

DTIC

Detection; Matched Filters; Optical Filters; Receivers; Shot Noise

20070003347 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Fundamental Research on Infrared Detection

Chuang, S L; Chang, Y C; Cheng, K Y; Dupuis, R D; Hsieh, K C; White, J O; Oct 15, 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0591

Report No.(s): AD-A459422; MURI-UIUC-GIT-05; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459422>;

Avail.: CASI: A03, Hardcopy

Fundamental research issues on infrared photodetectors are reported. These include the following: Task 1. HgCdTe (MCT) defect study Continuing the research on degradation of MCT, we explore the size changing of the dislocation loops and the effect of low-dose electron beam irradiation during TEM analysis. Self-energy correction is included to calculate the MCT defect states. For the photoluminescence image, we correlate the PL images from MCTs and their CZT substrates. Task 2. Antimony-based type-II superlattice (T2-SL) photodetectors We explored the temperature dependent and noise current characteristics of interband cascade detectors (ICDs). We also acquired type-II superlattice photodiodes from Jet Propulsion Lab and obtained a high detectivity of 5.23×10^{10} cmHz^{1/2}/W at 77 K with devices of 10.5 μ m cutoff wavelength. Moreover, MOCVD growth of InAs/GaSb type-II superlattices was explored with substrates of both GaSb and GaAs. Task 3. Quantum dot infrared photodetectors (QDIPs) Our work has been focused on the growth and fabrication of high performance QDIP devices based on technologies developed. Defect-free 100-period InAs QD structure has been demonstrated. For InAs QDIPs grown on InP substrates by molecular beam epitaxy (MBE), peak detectivity of 2.1×10^9 cmHz^{1/2}/W was achieved at a bias voltage of 0.8V.

DTIC

Infrared Detectors; Photometers

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*.

20070002738 Lawrence Livermore National Lab., Livermore, CA USA

FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation

Nelson, A.; Dunn, J.; van Buuren, T.; Budil, K.; Sadigh, B.; Feb. 16, 2006; 18 pp.; In English

Report No.(s): DE2006-885383; No Copyright; Avail.: National Technical Information Service (NTIS)

Established techniques must be extended down to the ps and sub-ps time domain to directly probe product states of materials under extreme conditions. We used short pulse ((1e) 1 ps) x-ray radiation to track changes in the physical properties in tandem with measurements of the atomic and electronic structure of materials undergoing fast laser excitation and shock-related phenomena. The sources included those already available at LLNL, including the picosecond X-ray laser as well as the ALS Femtosecond Phenomena beamline and the SSRL based sub-picosecond photon source (SPPS). These allow the temporal resolution to be improved by 2 orders of magnitude over the current state-of-the-art, which is (approx) 100 ps. Thus, we observed the manifestations of dynamical processes with unprecedented time resolution. Time-resolved x-ray photoemission spectroscopy and x-ray scattering were used to study phase changes in materials with sub-picosecond time resolution. These experiments coupled to multiscale modeling allow us to explore the physics of materials in high laser fields and extreme non-equilibrium states of matter.

NTIS

Excitation; X Ray Lasers

20070002916 NASA Langley Research Center, Hampton, VA, USA

Advanced 2-micron Solid-state Laser for Wind and CO₂ Lidar Applications

Yu, Jirong; Trieu, Bo C.; Petros, Mulugeta; Bai, Yingxin; Petzar, Paul J.; Koch, Grady J.; Singh, Upendra N.; Kavaya, Michael J.; [2006]; 12 pp.; In English; SPIE 5th International Symposium on Asia-Pacific Remote Sensing Conference 2006, 13-17 Nov. 2006, Goa, India; Original contains color illustrations

Contract(s)/Grant(s): WBS 643.02.02.02.04; Copyright; Avail.: CASI: [A03](#), Hardcopy

Significant advancements in the 2-micron laser development have been made recently. Solid-state 2-micron laser is a key subsystem for a coherent Doppler lidar that measures the horizontal and vertical wind velocities with high precision and resolution. The same laser, after a few modifications, can also be used in a Differential Absorption Lidar (DIAL) system for measuring atmospheric CO₂ concentration profiles. The world record 2-micron laser energy is demonstrated with an oscillator and two amplifiers system. It generates more than one joule per pulse energy with excellent beam quality. Based on the successful demonstration of a fully conductive cooled oscillator by using heat pipe technology, an improved fully conductively cooled 2-micron amplifier was designed, manufactured and integrated. It virtually eliminates the running coolant to increase the overall system efficiency and reliability. In addition to technology development and demonstration, a compact and engineering hardened 2-micron laser is under development. It is capable of producing 250 mJ at 10 Hz by an oscillator and one amplifier. This compact laser is expected to be integrated to a lidar system and take field measurements. The recent achievements push forward the readiness of such a laser system for space lidar applications. This paper will review the developments of the state-of-the-art solid-state 2-micron laser.

Author

Doppler Radar; Wind Velocity; Solid State Lasers; Differential Absorption Lidar; Infrared Radar; Laser Applications; Atmospheric Composition

20070003010 Northrop Grumman Corp., San Antonio, TX USA

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom

Jindra, Nichole M; Figueroa, Manuel A; Rockwell, Benjamin A; Chavey, Lucas J; Zohner, Justin J; Nov 2006; 30 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F41624-02-D-7003; Proj-7757

Report No.(s): AD-A458757; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458757>; Avail.: CASI: [A03](#), HC

An optical phantom was designed to physically and optically resemble human tissue, in an effort to provide an alternative for detecting visual damage resulting from inadvertent exposure to infrared lasers. The phantom was exposed to a 1540-nm, Erbium:Glass, Q-switched laser with a beam diameter of 5 mm for 30 ns at varying power levels. Various materials were tested for use in the phantom; including agar, ballistic media, and silicone rubber. The samples were analyzed for damage lesions immediately after exposure and the Minimum Visible Lesion - Estimated Dose 50% (MVL-ED50) thresholds were determined from the data. In addition, any visible damage was evaluated for similarity to human tissue damage to determine if the phantom tissue would be a suitable substitute for in vivo exposures.

DTIC

Culture Media; Epoxy Resins; Exposure; Infrared Lasers; Laser Damage

20070003052 Air Force Research Lab., Wright-Patterson AFB, OH USA

Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticulates

Barnes, Paul N; Haugan, Timothy J; Sumption, Michael D; Harrison, B C; Oct 2004; 6 pp.; In English

Contract(s)/Grant(s): Proj-3145

Report No.(s): AD-A458884; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458884>; Avail.: CASI: [A02](#), HC

A comparison study is given of a typical superconducting YBa₂Cu₃O_{7-d} (Y123) film and a Y123 film containing a nonsuperconducting Y₂BaCuO₅ (Y211) phase nanoparticulate dispersion. The inclusion of the second phase nanoparticulates was for the express purpose of increasing superconducting film's magnetic pinning strength with the resultant improved in-field critical current density. LaAlO₃ substrates were used and the Y123 and Y211 nanoparticulates were grown by pulsed laser deposition (PLD). The Y211 nanoparticulate dispersion in the Y123 resulted from multiple consecutive depositions by PLD of the respective targets. The Y123 phase maintained excellent epitaxy with high in-plane orientation with and without the Y211 inclusions. With the Y211 additions, the critical current densities of the films increased significantly in applied magnetic fields as compared to the high quality Y123 film with no Y211 additions.

DTIC

Augmentation; Nanoparticles; Pinning; Pulsed Lasers; Semiconducting Films; Thin Films

20070003106 Air Force Research Lab., Kirkland AFB, NM USA

Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint)

Ross, T S; Latham, William P; Aug 1, 2006; 40 pp.; In English

Contract(s)/Grant(s): Proj-4866

Report No.(s): AD-A458969; DF297074; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458969>; Avail.: CASI: A03, Hardcopy

Along with power output of the laser system, laser optical quality or beam quality provides a suitable measure of performance. Power and beam quality are standards for the comparison of laser systems with each other and against mission requirements. An understanding of the meaning of beam quality is necessary to completely define laser performance capability. The current state of our community includes a multitude of different and not well understood beam quality measures, M (exp 2), Strehl Ratio, brightness, power in the bucket, 'times diffraction limited' and mode content determined by a variety of beam radius measures: half-widths, second-moment radius, widths at 1/e or 1/e (exp 2) points, width of primary lobe, etc. Another complication is that different elements of the community use different measures to evaluate optical quality characteristics. We examine the assumptions behind common measures of beam quality and compare the various measures as they relate to beams from laser employing stable resonant optical cavities. We show how the mode composition of a beam depends on prior determination of beam radius and how the term 'times diffraction limited' can mean different things depending on the method used to measure beam radius. We show the ambiguities that arise between certain classes of beams and measures of beam quality and advocate for a laser beam quality standard that relates directly to mission requirements.

DTIC

High Power Lasers; Laser Beams; Quality Control

20070003322 Illinois Univ. at Urbana-Champaign, Urbana, IL USA

Photonic Crystal Light Emitting Diodes

Choquette, Kent D; Raftery, Jr, James J; Jan 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0299

Report No.(s): AD-A459348; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459348>; Avail.: CASI: A03, Hardcopy

Coherently coupled arrays of vertical cavity surface emitting lasers (VCSELs) offer the potential of extended area coherent sources useful in a variety of applications in the high power (laser radar, optical communications, steerable sources) and low power (image processing, spectroscopic sensing, optical logic) regimes. A recently developed method for providing optical confinement is the introduction of a two-dimensional photonic crystal (PhC) pattern with a defect, etched into the top distributed Bragg reflector, to define a defect cavity in a VCSEL. This report investigates the operation of PhC VCSELs that have multiple defect cavities to form arrays of vertically emitting lasers. A major achievement of this work is coherent coupling between the defect cavities, with both out-of-phase and in-phase coherent coupling in defect cavity arrays. A qualitative and quantitative understanding of the optical characteristics of PhC VCSEL arrays was developed and demonstrated by the agreement of simulated to experiment results. Other conclusions supported by this study are: (1) different wafers result in coupling at different overlap integral values; (2) coupling can be effected by thermal effects (hysteresis observed), and (3) the relative phase difference between the defect cavities can be varied with injection current during both continuous-wave and pulsed operation.

DTIC

Crystals; Laser Cavities; Lasers; Light Emitting Diodes; Surface Emitting Lasers

37

MECHANICAL ENGINEERING

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see 63 *Cybernetics, Artificial Intelligence, and Robotics*; and 54 *Man/System Technology and Life Support*.

20070003138 Florida State Univ., Tallahassee, FL USA

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators

Oates, William S; Evans, Phillip G; Smith, Ralph C; Dapino, Marcelo J; Jan 2006; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0203; N00014-06-1-0530

Report No.(s): AD-A459020; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459020>; Avail.: CASI: A03, Hardcopy

A hybrid nonlinear optimal control design is experimentally implemented on a ferromagnetic Terfenol-D actuator to illustrate enhanced tracking control at relatively high speed. The control design employs a homogenized energy model to quantify rate-dependent nonlinear and hysteretic ferromagnetic switching behavior. The homogenized energy model is incorporated into a finite-dimensional nonlinear optimal control design to directly compensate for the nonlinear and hysteretic ferromagnetic constitutive behavior of the Terfenol-D actuator. Additionally, robustness to operating uncertainties is addressed by incorporating proportional-integral (PI) perturbation feedback around the optimal open loop response. Experimental results illustrate significant improvements in tracking control in comparison to PI control. Accurate displacement tracking is achieved for sinusoidal reference displacements at frequencies up to 1 kHz using the hybrid nonlinear control design whereas tracking errors become significant for the PI controller for frequencies equal to or greater than 500 Hz.

DTIC

Actuators; Ferromagnetic Materials; Magnetostriction; Nonlinear Systems; Nonlinearity

20070003142 Florida State Univ., Tallahassee, FL USA

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers

Oates, William S; Evans, Phillip; Smith, Ralph C; Dapino, Marcelo J; Jan 2006; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0203

Report No.(s): AD-A459024; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459024>; Avail.: CASI: [A02](#),

Hardcopy

In this paper, we discuss the development and experimental implementation of a nonlinear control design for magnetostrictive transducers operating in hysteretic regimes. The hysteresis and constitutive nonlinearities are characterized using a homogenized energy framework based on energy relations at the lattice level employed in combination with stochastic homogenization techniques that incorporate material and field nonhomogeneities. Using this framework, we employ nonlinear optimal control theory to construct open loop inputs for tracking. We subsequently employ PI-based perturbation feedback to ensure robustness with respect to model uncertainty and sensor noise. Experimental implementation results at frequencies up to 1000 Hz demonstrate the feasibility of the method for high speed tracking while operating in highly nonlinear operating regimes.

DTIC

Actuators; Control Theory; Magnetostriction; Nonlinear Systems; Nonlinearity; Transducers

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*.

20070002825 Kentucky Univ., Lexington, KY USA

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky

Zatar, W. A.; Ren, W. X.; Harik, I. E.; Sep. 2006; 138 pp.; In English

Contract(s)/Grant(s): KYSPR-206

Report No.(s): PB2007-103571; KTC-06-25/SPR206-00-6F; No Copyright; Avail.: National Technical Information Service (NTIS)

The main objective of this study is to assess the structural integrity of the I-24 parallel bridges at the Cumberland River crossing in western Kentucky. Due to its importance, the bridge is evaluated for the 250-year event and the maximum credible 500-year event. The scope of the work included: (1) field testing of the main bridge; (2) finite element modeling and calibration; (3) time-history seismic response analysis for the main spans; and (4) seismic evaluation for both the main and the approach spans.

NTIS

Highways; Kentucky; Rivers; Structural Analysis; Bridges (Structures)

20070002827 Kentucky Univ., Lexington, KY USA

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky

Zhao, T.; Ren, W. X.; Harik, I. E.; Hu, J. D.; Sep. 2006; 126 pp.; In English

Contract(s)/Grant(s): KYSPR-206

Report No.(s): PB2007-103570; KTC-06-24/SPR206-00-5F; No Copyright; Avail.: National Technical Information Service (NTIS)

This report presents the seismic evaluation of the approaches and parallel bridges on I-24 crossing the Tennessee River between Marshall and Livingston counties in Western Kentucky. The main bridges are steel tied-arch bridges. The bridges are situated within the influence of the New Madrid Seismic Zone. The seismic evaluation program consisted of field testing, 3-dimensional finite element modeling and seismic response analysis. The dynamic properties of the main bridges are determined through field testing, and are used to calibrate the finite element models. The finite element model is then subjected to time histories of the 250-year and 500-year earthquake events. Stresses and displacements for these events are found to be within the acceptable limits. Analytical results indicate that the main bridge will withstand the 250-year and 500-year earthquakes without any significant damage and no loss-of-span. The supports with fixed bearings on the pier of the main bridge need to be retrofitted for the 500-year earthquake event.

NTIS

Highways; Kentucky; Rivers; Dynamic Structural Analysis; Bridges (Structures)

20070002899 NASA Glenn Research Center, Cleveland, OH, USA

Fracture Toughness of Thin Plates by the Double-Torsion Test Method

Salem, Jonathan A.; Radovic, Miladin; Lara-Curzio, Edgar; Nelson, George; [2006]; 10 pp.; In English; 30th International Conference and Exposition on Advanced Ceramics and Composites, 22-27 Jan. 2006, Cocoa Beach, FL, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): DE-AC05-00OR-22725

Report No.(s): ICACC-S1-070-2006; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002899>; Avail.: CASI:

A02, Hardcopy

Double torsion testing can produce fracture toughness values without crack length measurement that are comparable to those measured via standardized techniques such as the chevron-notch, surface-crack-in-flexure and precracked beam if the appropriate geometry is employed, and the material does not exhibit increasing crack growth resistance. Results to date indicate that $8 \leq W/d \leq 80$ and $L/W \geq 2$ are required if crack length is not considered in stress intensity calculations. At $L/W = 2$, the normalized crack length should be $0.35 \leq a/L \leq 0.65$; whereas for $L/W = 3$, $0.2 \leq a/L \leq 0.75$ is acceptable. In addition, the load-points need to roll to reduce friction. For an alumina exhibiting increasing crack growth resistance, values corresponding to the plateau of the R-curve were measured. For very thin plates ($W/d \geq 80$) nonlinear effects were encountered.

Author

Fracture Strength; Thin Plates; Torsion; Fracture Mechanics

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*.

20070002797 Multidisciplinary Center for Earthquake Engineering Research, Buffalo, NY, USA

Student Research Accomplishments, 2004-2005

May 2006; 88 pp.; In English

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

Report No.(s): PB2007-105146; MCEER-06-SP04; No Copyright; Avail.: National Technical Information Service (NTIS)

This sixth issue of the Student Research Accomplishments from the Multidisciplinary Center for Earthquake Engineering Research (MCEER) features papers submitted to MCEER's Best Student Article Competition. Topics range from traditional civil and lifeline engineering to applications of advanced technologies, social impacts, and economic modeling. The ten full-length papers contained in this volume include: Seismic Response of Hybrid Systems with Metallic and Viscous Dampers; Soil Densification Using Vibro-Stone Columns Supplemented with Wick Drains; Seismic Response of Steel Framed Hospital Buildings with Self-Centering Systems; Finite Element Parametric Study of Hybrid Rectangular Links for Eccentrically

Braced Frames; Seismic Resilience; The Double Concave Friction Pendulum Bearing; Estimation of Kinetic Friction Coefficient for Sliding Rigid Block Nonstructural Components; Liquefaction Assessment By Energy Approach; A Design Procedure for Liquefaction Mitigation of Silty Soils Using Dynamic Compaction; and Design Applications for Controlled Rocking System Retrofit Approach (Abstract was compiled from text).

NTIS

Earthquakes; Education; Research; Students

43

EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photography. For related instrumentation see *35 Instrumentation and Photography*.

20070002135 Corps of Engineers, Washington, DC USA

Terrain Study of Hunter Liggett Military Reservation, Camp Roberts and Hearst Estate

Jan 1956; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458775; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This report summarizes information on terrain conditions which would effect military operations in the study area. It includes data on the extent and condition of the existing road net; the distribution of vegetation types and their effect on military operations; and the feasibility of off-road movement of vehicles as controlled by slope, soil conditions, and vegetation. The report is based on published information, photo-interpretation, and field investigations.

DTIC

Terrain; Military Operations; Soils

20070002136 Corps of Engineers, Washington, DC USA

Terrain Study of Hunter Liggett Military Reservation, Camp Reberts and Hearst Estate

Jan 1956; 35 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458777; No Copyright; Avail.: CASI: [A03](#), Hardcopy

This report summarizes information on terrain conditions which could effect military operations in the study area. It includes data on the extent and condition of the existing road net; the distribution of vegetation types and their effect on military operations; and the feasibility of off-road movement of vehicles as controlled by slope, soil conditions, and vegetation. The report is based on published information, photo-interpretation, and field investigations.

DTIC

Terrain; Military Operations; Soils

20070002524 NASA Ames Research Center, Moffett Field, CA, USA

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI

Potter, C. S.; Brooks, V.; 1997; 1 pp.; In English; No Copyright; Avail.: Other Sources; Abstract Only

This paper describes the use of satellite data to calibrate a new climate-vegetation greenness relationship for global change studies. We examined statistical relationships between annual climate indexes (temperature, precipitation, and surface radiation) and seasonal attributes. If the AVHRR Normalized Difference Vegetation Index (NDVI) time series for the mid-1980's in order to refine our understanding of intra-annual patterns and global abiotic controls on natural vegetation dynamics. Multiple linear regression results using global 10 gridded data sets suggest that three climate indexes: degree days (growing/chilling), annual precipitation total, and an annual moisture index together can account to 70-80 percent of the geographic variation in the NDVI seasonal extremes (maximum and minimum values) for the calibration year 1984. Inclusion of the same annual climate index values from the previous year explains no substantial additional portion of the global scale variation in NDVI seasonal extremes. The monthly timing of NDVI extremes is closely associated with seasonal patterns in maximum and minimum temperature and rainfall, with lag times of 1 to 2 months. We separated well-drained areas from 10 grid cells mapped as greater than 25 percent inundated coverage for estimation of both the magnitude and timing of seasonal NDVI maximum values. Predicted monthly NDVI, derived from our climate-based regression equations and Fourier smoothing algorithms, shows good agreement with observed NDVI for several different years at a series of ecosystem test locations from around the globe. Regions in which NDVI seasonal extremes are not accurately predicted are mainly high

latitude zones, mixed and disturbed vegetation types, and other remote locations where climate station data are sparse.

Author

Normalized Difference Vegetation Index; Advanced Very High Resolution Radiometer; Time Series Analysis; Ecosystems; Moisture

20070002692 NASA Ames Research Center, Moffett Field, CA, USA

Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution

Hlavka, C. A.; [January 1997]; 1 pp.; In English

Contract(s)/Grant(s): RTOP 274-52-71-15; No Copyright; Avail.: Other Sources; Abstract Only

Analysis of classified satellite imagery was conducted to characterize errors in estimates of area based on coarse resolution satellite imagery which are due to distortions in sizes of small fragments, and to explore the feasibility of correcting for these errors using a statistical modeling approach. Sizes of bodies of open water on European Remote-Sensing (ERS-1) synthetic aperture radar (SAR) and fire scars on Landsat Multispectral Scanner (MSS) imagery were measured using geographic information system (GIS) software. Statistical analysis of the smaller scars and ponds as observed with this imagery of relatively fine resolution demonstrated that the distribution of the sizes could be modeled by either of two types of statistical distributions—a power distribution related to fractal processes or a simple exponential distribution. A comparison of the size distribution of small burn scars as observed with Landsat with the distribution observed with the much coarser Advanced Very High Resolution Radiometer (AVHRR) imagery revealed effects of coarse resolution, each of which were associated with a particular size range, and whose net effect accounted for the bias in total burn area due to coarse spatial resolution. Size dependent area correction procedures are therefore feasible. A statistical modeling approach to area estimation, based models of the underlying and observed size distributions of fragments in the scene, may lead to a procedure which requires little or no ancillary data.

Author

Statistical Analysis; Mathematical Models; Remote Sensing; Satellite Imagery; Spatial Resolution; Coarseness; Terrain

20070002809 NASA Marshall Space Flight Center, Huntsville, AL, USA

Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment

Quattrochi, Dale A.; Estes, Maurice G., Jr.; Crosson, William; Johnson, Hoyt; Khan, Maudood; [2006]; 1 pp.; In English; Earth Observation for Urban Planning and Management, 20-21 Nov. 2005, Hong Kong; Copyright; Avail.: Other Sources; Abstract Only

The growth of cities, both in population and areal extent, appears as an inexorable process. Urbanization continues at a rapid rate, and it is estimated that by the year 2025, 60 percent of the world's population will live in cities. Urban expansion has profound impacts on a host of biophysical, environmental, and atmospheric processes within an urban ecosystems perspective. A reduction in air quality over cities is a major result of these impacts. Because of its complexity, the urban landscape is not adequately captured in air quality models such as the Community Multiscale Air Quality (CMAQ) model that is used to assess whether urban areas are in attainment of EPA air quality standards, primarily for ground level ozone. This inadequacy of the CMAQ model to sufficiently respond to the heterogeneous nature of the urban landscape can impact how well the model predicts ozone levels over metropolitan areas and ultimately, whether cities exceed EPA ozone air quality standards. We are exploring the utility of high-resolution remote sensing data and urban spatial growth modeling (SGM) projections as improved inputs to a meteorological/air quality modeling system focusing on the Atlanta, Georgia metropolitan area as a case study. These growth projections include business as usual and smart growth scenarios out to 2030. The growth projections illustrate the effects of employing urban heat island mitigation strategies, such as increasing tree canopy and albedo across the Atlanta metro area, which in turn, are used to model how air temperature can potentially be moderated as impacts on elevating ground-level ozone, as opposed to not utilizing heat island mitigation strategies. The National Land Cover Dataset at 30m resolution is being used as the land use/land cover input and aggregated to the 4km scale for the MM5 mesoscale meteorological model and the CMAQ modeling schemes. Use of these data has been found to better characterize low density/suburban development as compared with USGS 1km land use/land cover data that have traditionally been used in modeling. Air quality prediction for future scenarios to 2030 is being facilitated by land use projections using a spatial growth model. Land use projections were developed using the 2030 Regional Transportation Plan developed by the Atlanta Regional Commission, the regional planning agency for the area. This allows the Georgia Environmental Protection Division to evaluate how these transportation plans will affect future air quality. The coupled SGM and air quality modeling approach provides insight on what the impacts of Atlanta's growth will be on the local and regional environment and exists as a mechanism that

can be used by policy makers to make rational decisions on urban growth and sustainability for the metropolitan area in the future.

Author

Air Quality; Environment Models; High Resolution; Remote Sensing; Georgia; Spatial Resolution; Mesometeorology

20070002821 NASA Marshall Space Flight Center, Huntsville, AL, USA

SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development

Irwin, Daniel E.; November 13, 2006; 1 pp.; In English; Geographic Information System (GIS) Day/Belize's Ministry of Natural Resources and the Environment, 13 Nov. 2006, Belmopan, Belize; No Copyright; Avail.: Other Sources; Abstract Only

Dan Irwin, the SERVIR Project Manager is being honored with the privilege of delivering the opening remarks at Belize's second celebration of GIS Day, a weeklong event to be held at the University of Belize's campus in the nation's capital, Belmopan. The request has been extended by the GIS Day Planning Committee which operates under the auspices of Belize's Ministry of Natural Resources & the Environment, which is the focal ministry for SERVIR. In the 20-30 min. allotted for the opening remarks, the SERVIR Project Manager will expound on how SERVIR, operating under the auspices of NASA's Ecological Forecasting Program, contributes to spatial data infrastructure (SDI) development in Belize. NASA's contributions to the region - particularly work under the Mesoamerican Biological Corridor - will be highlighted. Continuing, the remarks will discuss SERVIR's role in Belize's steadily expanding SDI, particularly in the context of delivering integrated decision support products via web-based infrastructure. The remarks will close with a call to the parties assembled to work together in the application of Earth Observation Systems technologies for the benefit of Belizean society as a whole. NASA's strong presence in Belize's GIS Day celebrations will be highlighted as sustained goodwill of the American people - in partial fulfillment of goals set forth under the Global Earth Observation System of Systems (GEOSS).

Author

Remote Sensing; Spatial Dependencies; Data Acquisition; Geographic Information Systems; Ecology

20070003035 Geological Survey, Reston, VA USA

Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems

Harrelson, Larry G; Fine, Jason M; Jan 2006; 90 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458862; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458862>; Avail.: CASI: A05, Hardcopy

The data presented in this report are for selected wells in North and South Carolina that are located in the Atlantic Coastal Plain aquifer system. The data represent a partial inventory of wells in the study area and are to be used to update a regional flow model for North and South Carolina. This inventory includes a total of 813 wells in North Carolina and 461 wells in South Carolina. The well data include well-identification numbers well locations by latitude and longitude, land-surface elevations, hole depths, well depths, dates of water-level measurements, and aquifer assignment and transmissivity. Ground-water data presented in this report were obtained from field investigations and compiled from existing well records, both published and unpublished.

DTIC

Aquifers; Coastal Plains; Ground Water

20070003175 Army Engineer Research and Development Center, Vicksburg, MS USA

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas

Klimas, Charles V; Murray, Elizabeth O; Langston, Henry; Witsell, Theo; Foti, Thomas; Holbrook, Rob; Dec 2006; 207 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459078; ERDC/EL-TR-06-14; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459078>; Avail.: CASI: A10, Hardcopy

Section 404 of the Clean Water Act directs the U.S. Army Corps of Engineers to administer a regulatory program for permitting the discharge of dredged or fill material in waters of the USA. As part of the permit review process, the impact of discharging dredged or fill material on wetland functions must be assessed. In 1996, a National Action Plan to Implement the Hydrogeomorphic Approach for developing Regional Guidebooks to assess wetland functions was published. The Hydrogeomorphic Approach is a collection of concepts and methods for developing functional indices and subsequently using

them to assess the capacity of a wetland to perform functions relative to similar wetlands in a region. This report, one of a series of Regional Guidebooks that will be published in accordance with the National Action Plan, applies the Hydrogeomorphic Approach to depressional wetlands in the Ouachita Mountains the Crowley s Ridge Regions of Arkansas in a planning and ecosystem restoration context.

DTIC

Arkansas; Forests; Geomorphology; Handbooks; Hydrology; Mountains; Wetlands

20070003178 Mitre Corp., McLean, VA USA

Reducing DoD Fossil-Fuel Dependence

Dimotakis, Paul; Grober, Robert; Lewis, Nate; Sep 2006; 105 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): 13069022-PS

Report No.(s): AD-A459082; JSR-06-135; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459082>; Avail.: CASI: A06, Hardcopy

In light of an increasing U.S. dependence on foreign oil, as well as rising fuel costs for the U.S. and the DoD, and implications with regard to national security and national defense, JASON was charged in 2006 by the DDR&E to assessing pathways to reduce DoD's dependence on fossil fuels. The key conclusions of the study are that, barring unforeseen circumstances, availability concerns are not a decision driver in the reduction of DoD fossil-fuel use at present. However, the need to improve logistics requirements and military capabilities, and, secondarily, the need to reduce fuel costs, as well as providing a prudent hedge against a foggy future, especially in the Middle East and South America, argue for a reduction in fuel use, in general.

DTIC

Fossil Fuels; Oils

20070003289 Idaho Univ., Moscow, ID USA

Allocating AUVs for Mine Map Development in MCM

Rajala, Andrew; Edwards, Dean; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-1-0674

Report No.(s): AD-A459286; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459286>; Avail.: CASI: A02, Hardcopy

When cooperating Autonomous Underwater Vehicles (AUVs) are used for large area mine countermeasures (MCM), it is important for each vehicle to have a map of the entire search area. If each AUV only has a map of the area it has covered, that information will be lost if the vehicle is lost. To build a complete coverage map in each AUV, a scheduling algorithm, language, and logic were developed. The scheduling algorithm is an optimized fuzzy logic system that assigns the formations AUVs to inspect mine like objects (MLOs), while keeping the formation together. The language was developed to communicate the information needed to build a map and deal with the limited bandwidth of underwater communication. The vehicle logic takes the communicated information and compiles it into a map. The fuzzy logic scheduling algorithm significantly improved how the formation allocated its resources and the map generated in each of the vehicles closely matched the actual map

DTIC

Maps; Underwater Vehicles

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*.

20070002563 National Renewable Energy Lab., Golden, CO USA

Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006)

Wophlgemuth, J.; Narayanan, M.; Jul. 2006; 72 pp.; In English

Report No.(s): DE2006-888679; NREL/SR-520-40191; No Copyright; Avail.: National Technical Information Service (NTIS)

The major objectives of this program were to continue the advancement of BP Solar polycrystalline silicon manufacturing technology. The Program included work in the following areas. Efforts in the casting area to increase ingot size, improve ingot material quality, and improve handling of silicon feedstock as it is loaded into the casting stations. Developing wire saws to slice 100 mm thick silicon wafers on 290 mm centers. Developing equipment for demounting and subsequent handling of very thin silicon wafers. Developing cell processes using 100 mm thick silicon wafers that produce encapsulated cells with efficiencies of at least 15.4% at an overall yield exceeding 95%. Expanding existing in-line manufacturing data reporting systems to provide active process control. Establishing a 50 MW (annual nominal capacity) green-field Mega-plant factory model template based on this new thin polycrystalline silicon technology. Facilitating an increase in the silicon feedstock industry's production capacity for lower-cost solar grade silicon feedstock.

NTIS

Manufacturing; Polycrystals; Solar Cells

20070002570 Nexant, CA, USA, Kearney and Associates, Vashon, WA, USA

Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004

Kelly, B.; Kearney, D.; Jul. 2006; 28 pp.; In English

Report No.(s): DE2006-887341; NREL/SR-550-40165; No Copyright; Avail.: National Technical Information Service (NTIS)

One requirement in a conceptual design of a solar power plant is to estimate the cost of the solar steam system. The main elements of that cost estimate are the solar collectors, control system, heat transfer fluid (HTF) piping system, HTF pump system, and solar heat exchangers. The piping system consists of header piping, valves, and fittings. Since the piping system cost can constitute up to 10% of the total solar system cost, it is important to obtain a reasonably accurate estimate. The piping system design also affects performance. The pumping power required to circulate the HTF through the system is a significant contributor to the plant parasitic power requirement. Further, the piping heat loss reduces the useful heat delivered by the solar field to the power plant. As part of their performance and cost modeling development for parabolic trough power plant development, Flabeg Solar International (Cologne, Germany) developed an internal solar field piping model termed SolPipe -- for use in their solar system design work on parabolic trough configurations. The purpose of the model was to estimate, for a solar field size and layout configuration, the piping system parts list, costs, and pumping power for the HTF flow at design capacity. These results can then be utilized to provide input into subsequent performance and investment cost models, with the final criterion being the impact of the solar field piping design on the overall levelized electricity cost. NREL requires a similar piping model to provide similar input to the Trough Excelergy parabolic trough plant performance and cost model. The purpose of the present work is to develop a spreadsheet model to satisfy this need. Flabeg has provided access to SolPipe for purposes of comparison of the methodology and results.

NTIS

Parabolic Reflectors; Solar Collectors; Solar System

20070002586 National Renewable Energy Lab., Golden, CO USA

Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind

Forsyth, T.; Tombari, C.; Nelson, M.; January 2006; 28 pp.; In English

Report No.(s): DE2006-885330; NREL/PR-500-40099; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Industries; Photovoltaic Conversion; Windpower Utilization

20070002588 National Renewable Energy Lab., Golden, CO USA

Wind Resource Mapping for USA Offshore Areas

Elliott, D.; Schwartz, M.; January 2006; 16 pp.; In English

Report No.(s): DE2006-885329; NREL/CP-500-40045; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is producing validated wind resource maps for priority offshore regions of the USA. This report describes the methodology used to validate the maps and to build a Geographic Information Systems (GIS) database to classify the offshore wind resource by state, water depth, distance from shore, and administrative unit.

NTIS

Thematic Mapping; United States; Windpower Utilization

20070002782 Oak Ridge National Lab., TN USA

Design and Synthesis of Oriented Guest-Host Nanostructures For Enhanced Membrane Performances

January 2006; 10 pp.; In English

Report No.(s): DE2006-885953; No Copyright; Avail.: National Technical Information Service (NTIS)

This project has demonstrated a novel nanomaterial design concept and a synthesis method for guest-host type superionic-conducting nanocomposite membranes. This concept consists of nanophases of oxide electrolyte nanograins (guest) encapsulated inside the nanopore channels of an oxide layer matrix (host), with channels oriented perpendicular to the layer surface. Using ionic conducting YSZ (yttrium stabilized zirconia) as a special case, we have shown that the host-guest design allows orientation of a large number channels, allowing a high density of nanograin boundaries/interfaces to be built into the film to enhance cross-membrane conductivity. This structure allowed conductivity measurements with impedance spectroscopy to be performed for the first time at room temperature. Cross-membrane conductivity values at low temperature ranges of interest are the higher than any reported values. The conductivity-enhancing mechanisms could be attributed to (1) controlled orientation and increased number density of YSZ nanograin-host interfaces and (2) creation and stabilization of YSZ nanocrystalline phases inside nanopore channels (>10 nm dia.). This successful initial demonstration of host-guest nanostructures is expected to have direct impact on fuel cell technologies, and may also have beneficial use in a broad range of applications such as in solar cells, sensors, chemical/gas separations, catalysis, and magnetic memory devices.

NTIS

Membranes; Nanostructures (Devices)

20070002882 Advanced Energy Conversion, LLC, Malta, NY, USA

Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation

Torrey, D. A.; May 23, 2006; 30 pp.; In English

Report No.(s): DE2006-882784; No Copyright; Avail.: Department of Energy Information Bridge

Through this project, Advanced Energy Conversion (AEC) has developed, tested, refined and is preparing to commercialize a 2.5kW utility-interactive inverter system for distributed generation. The inverter technology embodies zero-voltage switching technology that will ultimately yield a system that is smaller, less expensive and more efficient than existing commercial technologies. This program has focused on commercial success through careful synthesis of technology, market-focus and business development. AEC was the primary participant. AEC is utilizing contract manufacturers in the early stages of production, allowing its technical staff to focus on quality control issues and product enhancements. The objective of this project was to bring the AEC inverter technology from its current pre-production state to a commercial product. Federal funds have been used to build and test production-intent inverters, support the implementation of the commercialization plan and bring the product to the point of UL certification.

NTIS

Commercialization; Inverters; Photovoltaic Conversion; Solar Energy

20070003260 Army Research Lab., Adelphi, MD USA

Model of High-Energy-Density Battery Based on SiC Schottky Diodes

Ngu, Yves; Litz, Marc; Geil, Bruce; Oct 2006; 20 pp.; In English

Report No.(s): AD-A459250; ARL-TR-3981; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459250>; Avail.:

CASI: [A03](#), Hardcopy

Silicon carbide (SiC) diodes are being investigated as direct energy converters (DECs) for use in small, long-lived nuclear power sources for unattended sensors. Voltage and current measurements on Schottky diodes fabricated from both Si and SiC result in typical efficiencies of 5 to 15%. A drift-diffusion model has been developed to predict the output and to help us better understand the radiation-induced current that results. This report describes the initial conditions, the drift-diffusion algorithm, and the material parameters used in the model. The results of the model compare well to experimental data.

DTIC

Electric Batteries; Radioisotope Batteries; Schottky Diodes; Silicon Carbides

20070003262 Universal Energy Systems, Inc., Dayton, OH USA

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint)

Reitz, T L; Xiao, H; Apr 2006; 6 pp.; In English

Contract(s)/Grant(s): FA8650-04-D-2404-0003; Proj-3145

Report No.(s): AD-A459252; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459252>; Avail.: CASI: [A02](#),

Hardcopy

In order to reduce the operating temperature of solid oxide fuel cells (SOFCs), anode-supported cells incorporating thin film electrolytes in conjunction with anode/electrolyte and cathode/electrolyte interlayers were studied. SOFC button cells were prepared through deposition of colloidal slurries onto anode supported substrates and were analyzed as a junction of temperature and polarization via Voltammetry and Electrochemical Impedance Spectroscopy (EIS). Single SOFC button cells with electrode interlayers were then characterized as a junction of temperature and polarization to assess the involvement of these interfacial layers. EIS was applied and the data were used to deconvolute component impedances. Finally, electrochemical models were developed to provide a more complete understanding of these assemblies under operation.

DTIC

Colloids; Deposition; Low Temperature; Solid Oxide Fuel Cells; Thin Films

20070003296 Technical Univ. of Munich, Muchen, Germany

Developing of Design Criteria for Highly Efficient Fuel Cells

Stimming, Ulrich; Jun 2006; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0311

Report No.(s): AD-A459295; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459295>; Avail.: CASI: A03,

Hardcopy

Catalytic activity of islands and single clusters prepared on different substrates using either delocalized deposition pulse technique or tip induced deposition in a electrochemical scanning tunneling microscope (EC STM) was studied in order to determine the optimal size and distribution of catalytic active metals. Activity at these islands, single clusters, as well as cluster arrays has been measured in situ immediately after preparation to avoid degeneration. In case of single Pd clusters and cluster arrays, our new developed technique utilizing an STM tip for local reactivity measurements has been applied. Furthermore, a novel preparation procedure for catalytically active nanopores has been developed to apply the pH sensing effect of hydrogen loaded Pd in future investigations.

DTIC

Design Analysis; Fuel Cells

45

ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20070002574 Wisconsin Electric Power Co., WI, USA

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006)

Derenne, S. T.; Apr. 28, 2006; 100 pp.; In English

Report No.(s): DE2006-885035; No Copyright; Avail.: National Technical Information Service (NTIS)

With the Nation's coal-burning utilities facing tighter controls on mercury pollutants, the U.S. Department of Energy is supporting projects that could offer power plant operators better ways to reduce these emissions at much lower costs. Sorbent injection technology represents one of the simplest and most mature approaches to controlling mercury emissions from coal-fired boilers. It involves injecting a solid material such as powdered activated carbon into the flue gas. The gas-phase mercury in the flue gas contacts the sorbent and attaches to its surface. The sorbent with the mercury attached is then collected by a particulate control device along with the other solid material, primarily fly ash. We Energies has over 3,200 MW of coal-fired generating capacity and supports an integrated multi-emission control strategy for SO₂, NO_x, and mercury emissions while maintaining a varied fuel mix for electric supply. The primary goal of this project is to reduce mercury emissions from three 90-MW units that burn Powder River Basin coal at the We Energies Presque Isle Power Plant. Additional goals are to reduce nitrogen oxide (NO_x), sulfur dioxide (SO₂), and particulate matter (PM) emissions, allow for reuse and sale of fly ash, demonstrate a reliable mercury continuous emission monitor (CEM) suitable for use in the power plant environment, and demonstrate a process to recover mercury captured in the sorbent. To achieve these goals, We Energies (the Participant) will design, install, and operate a TOXECON system designed to clean the combined flue gases of Units 7, 8, and 9 at the Presque Isle Power Plant. TOXECON is a patented process in which a fabric filter system (baghouse) installed downstream of an existing particle control device is used in conjunction with sorbent injection for removal of pollutants from combustion flue gas. For this project, the flue gas emissions will be controlled from the three units using a single baghouse. Mercury will be controlled by injection of activated carbon or other novel sorbents, while NO_x and SO₂ will be controlled by injection of sodium-based or other novel sorbents. Addition of the TOXECON baghouse will provide enhanced particulate

control. Sorbents will be injected downstream of the existing particle collection device to allow for continued sale and reuse of captured fly ash from the existing particulate control device, uncontaminated by activated carbon or sodium sorbents. Methods for sorbent regeneration, i.e., mercury recovery from the sorbent, will be explored and evaluated. For mercury concentration monitoring in the flue gas streams, components available for use will be evaluated and the best available will be integrated into a mercury CEM suitable for use in the power plant environment. This project will provide for the use of a control system to reduce emissions of mercury while minimizing waste from a coal-fired power generation system.

NTIS

Air Pollution; Boilers; Coal; Combustion; Contaminants; Particulates; Pollution Control

20070002582 Kentucky Univ., Lexington, KY, USA

Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006

Grosso, J.; Robl, T.; Rathbone, R.; Jun. 2006; 22 pp.; In English

Report No.(s): DE2006-886683; No Copyright; Avail.: Department of Energy Information Bridge

The objective of the project is to build a multi-product ash beneficiation plant at Kentucky Utilities 2,200-MW Ghent Generating Station, located in Carroll County, Kentucky. This part of the study includes an investigation of the secondary classification characteristics of the ash feedstock excavated from the lower ash pond at Ghent Station. The secondary classification testing was concluded using a continuous demonstration-scale lamella classifier that was operated at a feed rate of 0.3 to 1.5 tons/hr. Feed to the secondary classifier was generated by operating the primary classifier at the conditions shown to be effective previously. Samples were taken while the secondary classifier was operated under a variety of conditions in order to determine the range of conditions where the unit could be efficiently operated.

NTIS

Ashes; Beneficiation; Coal Utilization; Industrial Plants

20070002583 Lawrence Livermore National Lab., Livermore, CA USA

Final Report for the Joint Urban 2003 Atmospheric Dispersion Study in Oklahoma City: Lawrence Livermore National Laboratory Participation

Leach, M. J.; Oct. 21, 2005; 98 pp.; In English

Report No.(s): DE2006-885407; UCRL-TR-216437; No Copyright; Avail.: National Technical Information Service (NTIS)

The Joint Urban 2003 (JU2003) field study was designed to collect meteorological and tracer data resolving atmospheric dispersion at scales-of-motion ranging from flows in and around a single city block, in and around several blocks in the downtown Central Business District (CBD), and into the suburban Oklahoma City area a km from the CBD. Indoor tracer and flow measurements within four downtown buildings were also made in conjunction with detailed outdoor measurements investigating the outdoor-indoor exchange rates and mechanisms. The movement of within the study buildings was also studied. The data from the field experiment is being used to evaluate models that are being developed for predicting dispersion of contaminants in urban areas. These models may be response models based on semi-empirical algorithms that are used in real-time emergencies, or highly sophisticated computational fluid dynamics models that resolve individual building faces and crevices. The data from the field experiment, together with models, can then be used to develop other advanced tools that are especially valuable efforts to thwart terrorists. These include tools for finding location and characteristics of a contaminant source; tools that can be used for real-time response or forensic investigation. The tools will make use of monitoring networks for biological agents that are being established in several sensitive cities throughout the nation. This major urban study was conducted beginning June 28 and ending July 31, 2003. It included several integrated scientific components necessary to describe and understand the physical processes governing dispersion within and surrounding an urban area and into and within building environments. The components included characterizing: (1) the urban boundary layer and the development of the urban boundary layer within the atmospheric boundary layer, (2) the flows within and downwind of the tall-building core, (3) the flows within a street canyon including the effects of traffic on turbulence, (4) the surface energy balance within an urban area, (5) the dispersion of tracer into, out of and within buildings, and (6) the dispersion of tracer throughout the tall-building core and out to four km downwind from the release. The scientific elements of the study were accomplished using state-of-the-art meteorological and tracer instruments including lidars, sodars, radars, sonic anemometers, airplane-based meteorological sensors, fastresponse tracer analyzers and helicopter-based remote tracer detectors. Winds and other meteorological quantities were measured continuously at nearly 200 locations in and around downtown Oklahoma City.

NTIS

Accidents; Cities; Computational Fluid Dynamics

20070002591 National Inst. for Occupational Safety and Health, Washington, DC, USA
NIOSH Health Hazard Evaluation Report: HETA No. 2001-0030-3020, Carolinas Medical Center, Charlotte, North Carolina, November 2006

Nov. 2006; 29 pp.; In English

Report No.(s): PB2007-103057; HETA-2001-0030-3020; No Copyright; Avail.: National Technical Information Service (NTIS)

The National Institute for Occupational Safety and Health (NIOSH) received a confidential employee request for a health hazard evaluation (HHE) at Carolinas Medical Center in Charlotte, North Carolina. This request noted that employees had concerns regarding the health effects of exposure to byproducts of surgical smoke. These byproducts are produced during surgical operations where electrocautery knives are used. NIOSH investigators conducted investigations in June and July 2001.

NTIS

Hazards; Health; Safety

20070002592 National Inst. for Occupational Safety and Health, Washington, DC, USA
NIOSH Health Hazard Evaluation Report: HETA No. 2000-0402-3021, Inova Fairfax Hospital, Falls Church, Virginia, November 2006

Nov. 2006; 31 pp.; In English

Report No.(s): PB2007-103056; HETA-2000-0402-3021; No Copyright; Avail.: National Technical Information Service (NTIS)

The National Institute for Occupational Safety and Health (NIOSH) received a confidential employee request for a health hazard evaluation (HHE) at Inova Fairfax Hospital in Falls Church, Virginia. This request noted that employees had concerns regarding the health effects of exposure to byproducts of surgical smoke. These byproducts are produced during surgical operations where electrocautery knives are used. NIOSH investigators conducted investigations in March and May 2001.

NTIS

Hazards; Health; Hospitals; Safety

20070002597 Environmental Quality Management, Inc., Durham, NC, USA, Environmental Protection Agency, Cincinnati, OH, USA

Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire

Thorneloe, S.; Oct. 2005; 136 pp.; In English

Report No.(s): PB2007-103044; EPA/600/R-05/142; No Copyright; Avail.: National Technical Information Service (NTIS)

The report describes a case study that applies EPA-600/R-05/123--the guidance for conducting air pathway analyses of landfill gas emissions that are of interest to superfund remedial project managers, on-scene coordinators, facility owners, and potentially responsible parties. The case study exemplifies the use of the procedures and tools described in the guidance for evaluating LFG emissions to ambient air. The air pathway analysis is used to evaluate the inhalation risks to offsite receptors as well as the hazards of both onsite and offsite methane explosions and landfill fires. Landfill gases detected at the site were methane and chemicals of particular concern (COPCs) that encompassed nonmethane organic compounds, 1,1-dichloroethene, benzene, chlorobenzene, chloroethane, 1,4-dichlorobenzene, methylene chloride, toluene, trichloroethene, vinyl chloride, and xylenes. The report includes values of 90th percentile concentration of COPCs and isopleths of the COPCs overlaid on an aerial photograph of the site.

NTIS

Air Pollution; Exhaust Emission; Exhaust Gases; Landfills

20070002599 National Inst. for Occupational Safety and Health, Washington, DC, USA
NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006

Oct. 2006; 26 pp.; In English

Report No.(s): PB2007-103039; HETA-2005-0291-3025; No Copyright; Avail.: National Technical Information Service (NTIS)

On July 8, 2005, the National Institute for Occupational Safety and Health (NIOSH) received a management request to conduct a health hazard evaluation (HHE) at the University of Dayton Research Institute (UDRI) in Dayton, Ohio. The request

asked NIOSH to evaluate potential sources of emissions from carbon nanofiber handling processes. No health complaints were reported by management or workers.

NTIS

Carbon; Environmental Surveys; Hazards; Health; Safety

20070002604 National Inst. for Occupational Safety and Health, Washington, DC, USA

NIOSH Health Hazard Evaluation Report: HETA No. 2004-0005-3024, Grove Park Inn Resort and Spa, Asheville, North Carolina, November 2006

Nov. 2006; 35 pp.; In English

Report No.(s): PB2007-103038; HETA-2004-0005-3024; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The National Institute for Occupational Safety and Health (NIOSH) received a health hazard evaluation request from employees of the Grove Park Inn Resort and Spa. We evaluated reports of chronic bronchitis and pneumonia, headaches, hoarseness, cough, sore throats, burning/watery eyes and nose, red and flaky nose, dizziness, nosebleeds, shortness of breath, nausea, inability to concentrate, sneezing, excess fatigue, fever, chills, muscle aches and dry, itchy skin, that workers believed may have been related to exposure to mold and fungus in the treatment rooms and gas released from pools. NIOSH investigators conducted site visits in November and December 2003 to look at these issues.

NTIS

Environmental Surveys; Hazards; Health; Safety

20070002607 National Inst. for Occupational Safety and Health, Washington, DC, USA

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006

Oct. 2006; 29 pp.; In English

Report No.(s): PB2007-103037; HETA-2001-0066-3019; No Copyright; Avail.: National Technical Information Service (NTIS)

On November 13, 2000, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from the management at Morton Plant Hospital in Dunedin, Florida. The request noted concerns from surgery department employees about possible health effects from exposure to byproducts of surgical smoke in the operating room. In March 2001, NIOSH investigators conducted a site visit to the facility and met with management and employee representatives. A return site visit was made in May 2001. A questionnaire regarding symptoms potentially associated with exposure to surgical smoke and its byproducts was distributed to employees of the surgery department. Personal breathing zone and area air samples were collected during 15 procedures over 3 days for substances commonly found in surgical smoke plume. These substances included volatile organic compounds (including benzene, toluene, and xylene), acrolein, phenol, cresols, hydrogen cyanide, formaldehyde, acetaldehyde, polycyclic aromatic compounds, and carbon monoxide.

NTIS

Hazards; Health; Hospitals; Safety; Smoke

20070002608 Environmental Protection Agency, San Francisco, CA, USA

Maricopa County Environmental Services Department, Title V Operating Permit Program Evaluation

May 18, 2005; 147 pp.; In English

Report No.(s): PB2007-103030; No Copyright; Avail.: National Technical Information Service (NTIS)

EPA has been informed that MCESD intends to reorganize its air quality program as a separate unit. As of this writing, details on the new structure are developing. In the absence of firm detail on the possible reorganization, EPA believes that the findings in this report are equally valid for the prior organization as formal recommendations, as well as for the successor organization for use as guideposts in forming a new, more effective air quality program. In response to the 2002 Office of Inspector General audit recommendations, the Environmental Protection Agency (EPA) has reexamined the ways it can improve state and local Title V operating permit programs and expedite permit issuance. Specifically, EPA developed an action plan for performing program reviews of Title V operating permit programs. EPA Headquarters (HQ) directed each Regional office to perform Title V program evaluations for each air pollution control agency beginning in fiscal year (FY) 2003.

NTIS

Air Pollution; Environment Management; Pollution Control

20070002609 Environmental Protection Agency, San Francisco, CA, USA

Arizona Department of Environmental Quality, Title V Operating Permit Program Evaluation

Jun. 02, 2006; 159 pp.; In English

Report No.(s): PB2007-103029; No Copyright; Avail.: National Technical Information Service (NTIS)

In response to the 2002 Office of Inspector General audit recommendations, the Environmental Protection Agency ('EPA') has re-examined the ways it can improve state and local Title V operating permit programs and expedite permit issuance. Specifically, EPA developed an action plan for performing program reviews of Title V operating permit programs. EPA Headquarters ('HQ') directed each Regional office to perform Title V program evaluations for each air pollution control agency beginning in fiscal year ('FY') 2003.

NTIS

Air Pollution; Environmental Quality; Pollution Control; Regulations

20070002764 Lawrence Livermore National Lab., Livermore, CA USA

Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry

Ferringtonson, D. P.; Pitesky, M. E.; Frank, M.; Horn, J. M.; Gard, E. E.; Oct. 18, 2005; 42 pp.; In English

Report No.(s): DE2006-885395; UCRL-CONF-216261; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Aerosols; Bacillus; Biological Weapons; Mass Spectroscopy; Spores

20070002771 New York State Dept. of Health, Albany, NY, USA, New York State Energy Research and Development Authority, New York, NY, USA

Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B

Jul. 17, 2006; 260 pp.; In English

Contract(s)/Grant(s): V50/ATV200002-11; NYSERDA-14-0034-01

Report No.(s): PB2006-113523; No Copyright; Avail.: National Technical Information Service (NTIS)

This report compares ambient levels of certain hazardous air pollutants, criteria pollutants, and bioaerosols in two New York City neighborhoods that have different rates of hospital admissions for asthma and different socio-economic status characteristics. Chemical and biological analytes were chosen for this study based on existing information suggesting that exposure to these analytes may be related to acute asthma exacerbations. In addition to data on many commonly measured chemical air pollutants, information was collected on several components of airborne particulate matter that have not previously been assessed for their possible association with asthma exacerbations. The primary goal was to assess whether ambient air quality differed in two New York City locations. It also presents the results of the analysis evaluating the effects of various air contaminants on acute asthma exacerbations.

NTIS

Air Pollution; Asthma; New York City (NY); Air Quality; Environmental Quality; Contaminants

20070002780 Sandia National Labs., Albuquerque, NM, USA

Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool

Griffith, R. O.; Ramsey, J. L.; Finley, P. D.; Melton, B. J.; Lucero, D. A.; Jun. 2006; 168 pp.; In English

Report No.(s): DE2006-888570; SAND2006-3784; No Copyright; Avail.: National Technical Information Service (NTIS)

In February of 2005, a joint exercise involving Sandia National Laboratories (SNL) and the National Institute for Occupational Safety and Health (NIOSH) was conducted in Albuquerque, NM. The SNL participants included the team developing the Building Restoration Operations and Optimization Model (BROOM), a software product developed to expedite sampling and data management activities applicable to facility restoration following a biological contamination event. Integrated data-collection, data-management, and visualization software improve the efficiency of cleanup, minimize facility downtime, and provide a transparent basis for reopening. The exercise was held at an SNL facility, the Coronado Club, a now-closed social club for Sandia employees located on Kirtland Air Force Base. Both NIOSH and SNL had specific objectives for the exercise, and all objectives were met.

NTIS

Aerosols; Biological Weapons; Contamination; Physical Exercise; Restoration

20070002872 Swedish Water and Air Pollution Research Lab., Stockholm, Sweden

Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses

Sternhufvud, C.; Belhaj, M.; Astrom, S.; Nov. 2006; 71 pp.; In English

Report No.(s): PB2007-103513; IVL-B1656; No Copyright; Avail.: National Technical Information Service (NTIS)

The overall purpose of this study is to compare the cost effectiveness of non-technical measures (NTM) and technical measures (TM). This requires an acceptable definition of NTM. There are two main questions discussed in this study in connection to the definition of NTM. Firstly, the distinction between technical measures and non-technical measures, and secondly the distinction between nontechnical measures and policy instruments. Based on the chosen definition of NTM, the project carried out two meta-analyses in the agricultural and energy sectors. Since data on the shipping sector was not enough to allow a meta-analysis this sector was studied in a descriptive manner. The results of the meta regression for the agricultural and the energy sector included in this study give some insight on the cost effectiveness of NTM compared to TM. Depending on the nature of the subject i.e., a review of NTM, the data has been very scarce to allow consistent and representative results for all European countries; Most of the NTM studied have only one study as origin. Further, the reviewed studies are often related to the emissions of different pollutants, which have led to the use of different conversion factors in order to run the meta regression.

NTIS

Air Pollution; Cost Effectiveness

20070003482 NASA Ames Research Center, Moffett Field, CA, USA

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs?

Pueschel, R. F.; Strawa, A. W.; Ferry, G. V.; Howard, S. D.; Verma, S.; [1998]; 1 pp.; In English; Fifth International Aerosol Conference, 12 - 18 Sept. 1998, Edinburgh, Scotland, UK

Contract(s)/Grant(s): RTOP# 538 08 12 14; No Copyright; Avail.: Other Sources; Abstract Only

Aerosol from aircraft can affect the environment in three ways: First, soot aerosol has been implicated to cause Icing-tern ozone depletion at mid-latitudes in the lower stratosphere at a rate of approx. 5% per decade. This effect is in addition and unrelated to the polar ozone holes which are strongly influenced by heterogeneous chemistry on polar stratospheric clouds. Second, the most obvious effect of jet aircraft is the formation of visible contrails in the upper troposphere. The Salt Lake City region experienced an 8% increase in cirrus cloud cover over a 15-year period which covariates with an increase in regional commercial air traffic. If soot particles act as freezing nuclei to cause contrail formation heterogeneously, they would be linked to a secondary effect to cloud modification that very likely is climatologically important. Third, a buildup of soot aerosol could reduce the single scatter albedo of stratospheric aerosol from $0.993+0.004$ to 0.98 , a critical value that has been postulated to separate stratospheric cooling from warming. Thus arises an important question: Do aircraft emit sufficient amounts of soot to have detrimental effects and warrant emission controls? During the 1996 SUCCESS field campaign, we sampled aerosols in the exhaust wake of a Boeing 757 aircraft and determined emission indices for sulfuric acid ($EI(\text{sub H}_2\text{SO}_4) = 9.0\text{E-}2$ and $5.0\text{E-}1$ g/kg (sub FUEL) for 75 and 675 ppm fuel-sulfur, respectively) and soot aerosol ($2.2\text{E-}3$ less than $EI(\text{sub SOOT}) = 1.1\text{E-}2$ g/kg (sub FUEL)). The soot particle analysis accounted for their fractal nature, determined electron-microscopically, which enhanced the surface area by a factor of 26 and the volume 11-fold over equivalent-volume spheres. The corresponding fuel-sulfur to H₂SO₄ conversion efficiency was 10% (for 675 ppm fuel-S) and 37% (for 75 ppm fuel-S). Applying the H₂SO₄ emission index to the 1990 fuel use by the world's commercial fleets of $1.3\text{E}11$ kg, a conversion efficiency of 30% of 500 ppm fuel-S would have led to an annual contribution to the atmospheric sulfur budget by aircraft of $2.7\text{E}7$ kg H₂SO₄. This is about one part in $1.4\text{E}4$ of anthropogenic sulfate from other sources. The soot emission index given above yielded a 1990 injection of soot aerosol by aircraft of $1.6\text{E}6$ kg. Thus, soot amounts to only five percent of the aerosol generated by aircraft. Its reactivity with ozone would have to be 20 times that of sulfuric acid particles to make it chemically significant. Nevertheless, the findings, of stratospheric soot loadings commensurate with aircraft fuel consumption, based on the emission index given above and the assumption of stratospheric residence times of the order of one year implicate aircraft as stratospheric pollutants. A trend similar to soot of H₂SO₄ aerosol loading could not be deciphered, neither from in situ measurements nor SAGE II satellite extinction, against the 'noise' due to volcanic eruptions. Observation of soot particles at 20 km altitude which, if emitted by aircraft were generated at 10-12 km altitude, suggests a displacement of those particles against gravity. Because eddy mixing is virtually absent in the lower stratosphere and isentropic mixing explains lofting to only about 15 km, radiometric forces acting on morphologically and chemically asymmetric soot particles must be considered

a possibility. The consequence could be an extended residence time of soot against that of sulfuric acid aerosol that would lower the single scatter albedo with time.

Author

Aerosols; Soot; Sulfuric Acid; Air Pollution; Jet Aircraft; Exhaust Emission

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*.

20070002141 NASA Marshall Space Flight Center, Huntsville, AL, USA

Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation

Gamayunov, K. V.; Khazanov, G. V.; [2006]; 1 pp.; In English; 2006 Huntsville Workshop, 2-6 Oct. 2006, Nashville, TN, USA; No Copyright; Avail.: Other Sources; Abstract Only

Electromagnetic ion cyclotron (EMIC) waves are widely observed in the inner and outer magnetosphere, at geostationary orbit, at high latitudes along the plasmopause, and at the ionospheric altitudes. Interaction of the Ring Current (RC) ions and EMIC waves causes ion scattering into the loss cone and leads to decay of the RC, especially during the main phase of storms when the RC decay times of about one hour or less are observed. The oblique EMIC waves damp due to Landau resonance with the thermal plasmaspheric electrons, and subsequent transport of the dissipating wave energy into the ionosphere below causes an ionosphere temperature enhancement. Induced scattering of these waves by the plasmaspheric thermal ions leads to ion temperature enhancement, and forms a so-called hot zone near the plasmopause where the temperature of core plasma ions can reach tens of thousands of degrees. Relativistic electrons in the outer radiation belt also interact well with the EMIC waves, and during the main and/or recovery phases of the storms these electrons can easily be scattered into the loss cone over a time scale from several hours to a day. The plasma density distribution in the magnetosphere and the ion content play a critical role in EMIC wave generation and propagation, but the wave dispersion relation in the known RC-EMIC wave interaction models is assumed to be determined by the thermal plasma distribution only. In these models, the modification of the EMIC wave dispersion relation caused by the RC ions is not taken into account, and the RC ions are only treated as a source of free energy in order to generate EMIC waves. At the same time, the RC ions can dominate the thermal magnetospheric content in the night MLT sector at great L shells during the main and/or recovery storm phase. In this study, using our self-consistent RC-EMIC wave model [Khazanov et al., 2006], we simulate the May 1998 storm in order to quantify the global EMIC wave redistribution caused by taking into account the RC ions in the EMIC wave dispersion relation. The dramatic wave pattern redistribution is observed in the postdusk-predawn MLT sector (night sector) for L greater than 5. We found the intense EMIC waves (about a few nT) there during the main and early recovery phases of the storm. The observed wave generation in this sector is caused by taking into account the EMIC wave dispersion change due to the RC ions. There are no waves at these locations in our model if the RC ions are taken into account in the wave growth rate only, and the wave dispersion relation is only governed by the thermal plasmaspheric model.

Author

Electromagnetic Radiation; Ring Currents; Wave Dispersion; Mathematical Models; Outer Radiation Belt

20070002828 Kentucky Univ., Lexington, KY USA

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky

Zatar, W.; Harik, I. E.; Yuan, P.; Choo, C. C.; Sep. 2006; 52 pp.; In English

Contract(s)/Grant(s): KYSPR-206

Report No.(s): PB2007-103566; KTC-06-26/SPR206-00-7F; No Copyright; Avail.: National Technical Information Service (NTIS)

This study represents one of the seismic evaluation of I-24 bridges investigative series. The focus is on slope or embankment stability and liquefaction potential of embankments of bridges along I-24 in Western Kentucky. A rating system is derived to assist in identifying and prioritizing bridge embankments that are susceptible to failure during to projected seismic events.

NTIS

Highways; Kentucky; Ranking; Bridges (Landforms); Structural Analysis; Seismology

20070003280 Army Research Lab., Aberdeen Proving Ground, MD USA

Another Analytical Approach to Predicting Munition Trajectories

Cooper, Gene R; Weinacht, Paul; Newill, James F; Sep 2006; 26 pp.; In English; Original contains color illustrations
Report No.(s): AD-A459274; ARL-TR-3948; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459274>; Avail.:
CASI: A03, Hardcopy

Analysis presented here addresses a previous problem concerning free-flight projectiles governed by the two-dimensional, point mass equations representing drag as a power law. Down-range distance is taken to be the independent variable which yields a third-order differential equation governing the projectile's flight. An approximate solution is obtained which is shown to be very accurate for gun elevation angles up to 30 degrees. Previously examined engineering characteristics for flat fire are reconsidered here with nonzero elevation angles over a range of projectile flight parameters. An important change from previous work is that gravity is never neglected when using the various parameterized drag curves, thus the velocity drag relation has gravity dependence. Firing table drag data are employed to study several examples using this analysis. Comparisons between analytical and numerical models to previous work are presented. This report shows that the results given here offer another simple means to examine the performance of low-yaw/high-velocity projectiles where the launch angle is as high as 30 degrees.

DTIC

Atmospheric Density; Drag; Equations of Motion; Predictions; Trajectories

20070003328 New Mexico State Univ., Las Cruces, NM USA

Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology

Goedecke, George H; Wilson, D K; Ostashev, Vladimir E; Jul 7, 2006; 24 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0104; DAAG19-01-1-0640

Report No.(s): AD-A459373; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459373>; Avail.: CASI: A03,
Hardcopy

Here, we contribute to the continuing development of the quasi-wavelet (QW) model of turbulence that is currently being used in simulations of sound propagation and scattering in the turbulent atmosphere. We show that a QW model of temperature fluctuations exists for any physically reasonable temperature spectrum of isotropic homogeneous turbulence, including the widely used von Karman spectrum. We derive a simple formula for the QW shape that reproduces a given spectrum exactly in the energy, transition, and inertial subranges. We also show that simple QW shapes can be normalized to yield an analytic expression for a temperature spectrum that is fairly close to any given spectrum. As an example, we match the Gaussian QW model to the von Karman spectrum as closely as possible, and find remarkably good agreement in all subranges including the dissipation subrange. We also derive formulae for the variance and kurtosis associated with the QW model, and show how the latter depends on the QW packing fraction and size distribution. We also illustrate how the visual appearance of several QW-simulated temperature fluctuation fields depends on the QW packing fraction, size distribution, and kurtosis.

DTIC

Atmospheric Circulation; Boundary Layers; Meteorology; Turbulent Flow; Variations; Wavelet Analysis

47

METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20070002528 National Space Science and Technology Center, Huntsville, AL, USA

Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone

Gillani, Noor; Koshak, William; Biazar, Arastoo; Doty, Kevin; Mahon, Robert; Newchurch, Michael; Byun, Daewon; Emmons, Louisa; [2006]; 1 pp.; In English; CASA Science Symposium on Nitrogen, 27-29 Sep. 2006, Lake Louise, Canada; Copyright; Avail.: Other Sources; Abstract Only

Our quantitative understanding of free tropospheric (FT) chemistry is quite poor. State-of-the-art regional air quality models (e.g., US EPA's CMAQ) perform very poorly in simulating FT chemistry, with uniform ozone around 70 ppb throughout the FT in summer, while ozonesonde data show much higher levels of ozone and much spatial-temporal structure. Such models completely neglect lightning-NO_x (LNO_x) emissions (the most significant source of NO_x in the FT), and also contain large uncertainties in the specifications of intercontinental transport, stratosphere-troposphere exchange (STE) and PBLFT exchange (PFTE). Global air chemistry models include LNO_x, but in very crude fashion, with the frequency and distribution of lightning being based on modeled cloud parameters (hence large uncertainty), lightning energetics being

assumed to be constant for all flashes (literature value, while in reality there is at least a two-orders of magnitude variability from flash-to-flash), and the production of NO_x in the surrounding heated air, per Joule of heating, being assumed to be constant also (literature value, while in fact it is a non-linear function of the dissipated heat and local air density, p). This situation is commonly blamed on paucity of pertinent observational data, but for the USA, there is now a wealth of surface- and satellite-based data of lightning available to permit much improved observation-based estimation of LNO_x emissions. In the FT, such NO_x has a long residence time, and also the ozone production efficiency from NO_x there is considerably higher than in the PBL. It is, therefore, of critical importance in FT chemistry. This paper will describe the approach and data products of an ongoing NSSTC project aimed at a much-improved quantification of not only LNO_x production on the scale of continental USA based on local and regional lightning observations, but also of intercontinental transport, STE and PFTE, all in upgraded simulations of tropospheric transport and chemistry. In our approach for LNO_x, (a) we utilize continuous observed lightning information from the NLDN ground network and from satellite imagers (OTD and LIS) to quantify lightning frequency and distribution at the spatial-temporal scales of models such as CMAQ; (b) we develop new methodologies to quantify flash-specific lightning energy dissipation as heat (epsilon) using data from the research-grade lightning measurement facility at NASA-KSC, and to parameterize epsilon based on regional lightning monitoring data (ground- and satellite-based); and, (c) we develop a new parameterization of NO_x production as a function of epsilon and rho. Based on such observation-based information, we are working to develop a gridded, episodic LNO_x emissions inventory for the USA for use in models like CMAQ. We are also developing approaches for global(MOZART)- regional(CMAQ) chemistry coupling to improve intercontinental transport and STE. Finally, we are developing new methodologies for assimilation of satellite-observed (GOES) clouds into meteorological modeling (MM5), to improve PFTE and to optimize co-location of cloud convection and observed lightning. We will incorporate these improvements in CMAQ simulations over the USA to better understand FT processes and chemistry, and its impact on ground-level ozone.

Author

Atmospheric Chemistry; Lightning; Nitrogen Oxides; Ozone; Troposphere

20070002555 Massachusetts Inst. of Tech., Lexington, MA, USA

ASR-9 Refractivity Measurements Using Ground Targets

Cho, J. Y. N.; Nov. 13, 2006; 46 pp.; In English

Report No.(s): PB2007-101891; ATC-328; No Copyright; Avail.: National Technical Information Service (NTIS)

Weather radars rely on the presence of radiowave scattering entities such as hydrometeors and insects to sense the dynamic evolution of the atmosphere. Under clear-air, low-reflectivity conditions, when no such 'visible' tracers are present, air mass boundaries such as the outflow edge of a dry microburst may go undetected. Recently, a radar data processing technique was developed to estimate the near-ground atmospheric refractivity field using ground targets. Refractivity is dependent on the moist thermodynamic variables of the atmosphere and, thus, can be used to detect air mass changes and boundaries. In this study, we apply this technique for the first time to Airport Surveillance Radar-9 (ASR-9) Weather Systems Processor (WSP) data. Comparisons with measurements from a meteorological station show good consistency. The potential exists for improving the capability of the WSP to detect low-reflectivity wind-shear phenomena by adding interest information provided by the estimated refractivity field. Adequate computational power is the sole requirement for implementing this scheme-aside from that, no alteration or addition is necessary to the ASR-9 hardware. Its primary weakness is the sensitivity to vertical variation in refractivity and variance of target height. It also has a limited range of coverage (approximately 20 km), but that is acceptable for terminal-area coverage. Further testing is needed during more appropriate meteorological conditions and at other sites to prove that dry wind-shear events can really be detected in the derived refractivity field by this class of radar, and that the technique is robust under various topographical settings.

NTIS

Refractivity; Targets

20070002630 U.S. Climate Change Science Program, Washington, DC, USA

Our Changing Planet: The U.S. Climate Change Science Program for Fiscal Year 2007. A Supplement to the President's Budget for Fiscal Year 2007

January 2007; 272 pp.; In English

Report No.(s): PB2007-104500; No Copyright; Avail.: National Technical Information Service (NTIS)

This Fiscal Year 2007 edition of Our Changing Planet highlights recent advances supported by CCSP-participating agencies in each of the programs research and observational elements, as called for in the Strategic Plan for the U.S. Climate Change Science Program released in July 2003. An addition to the report includes an analysis of the significant progress that CCSP has made toward its overarching goals since the release of the Strategic Plan. The document describes a wide range of

new and emerging observational capabilities which, combined with the programs analytical work, are leading to remarkable advances in understanding the underlying processes responsible for climate variability and change. It illustrates advances in U.S. modeling capabilities to represent past, present, and potential future changes in the physical and biological dimensions of the Earth system. The report also highlights progress being made to explore the uses and limitations of evolving knowledge to manage risks and opportunities related to climate variability and change. The final chapter documents the programs numerous current activities to promote cooperation between the U.S. scientific community and its worldwide counterparts. The document also outlines how CCSP plans to continue implementation of the Strategic Plan during FY 2007. The program will continue to emphasize work on 21 scientific synthesis and assessment reports. The first of these, Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences, was released in April of this year and answers a set of key questions related to ongoing observations of the Earths temperature.

NTIS

Climate Change; Risk; Global Warming

20070002700 NASA Marshall Space Flight Center, Huntsville, AL, USA

Use of High-resolution WRF Simulations to Forecast Lightning Threat

McCaul, William E.; LaCasse, K.; Goodman, S. J.; [2006]; 1 pp.; In English; 23rd Severe Storms Conference, 6-10 Nov. 2006, Saint Louis, MO, USA; Copyright; Avail.: Other Sources; Abstract Only

Recent observational studies have confirmed the existence of a robust statistical relationship between lightning flash rates and the amount of large precipitating ice hydrometeors in storms. This relationship is exploited, in conjunction with the capabilities of recent forecast models such as WRF, to forecast the threat of lightning from convective storms using the output fields from the model forecasts. The simulated vertical flux of graupel at -15C is used in this study as a proxy for charge separation processes and their associated lightning risk. Six-h simulations are conducted for a number of case studies for which three-dimensional lightning validation data from the North Alabama Lightning Mapping Array are available. Experiments indicate that initialization of the WRF model on a 2 km grid using Eta boundary conditions, Doppler radar radial velocity and reflectivity fields, and METAR and ACARS data yield the most realistic simulations. An array of subjective and objective statistical metrics are employed to document the utility of the WRF forecasts. The simulation results are also compared to other more traditional means of forecasting convective storms, such as those based on inspection of the convective available potential energy field.

Author

Lightning; Forecasting; Hydrometeors; Ice; Statistical Correlation; Boundary Conditions; Doppler Radar

20070002729 NASA Langley Research Center, Hampton, VA, USA

Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000

Bergstrom, Robert W.; Pilewskie, Peter; Schmid, Beat; Russell, Philip B.; Journal of Geophysical Research; February 18, 2003; ISSN 0148-0227; Volume 108; 12 pp.; In English

Contract(s)/Grant(s): SAFARI-2000; NCC2-1391

Report No.(s): Paper-2002JD002435; Copyright; Avail.: Other Sources

Using measurements of the spectral solar radiative flux and optical depth for 2 days (24 August and 6 September 2000) during the SAFARI 2000 intensive field experiment and a detailed radiative transfer model, we estimate the spectral single scattering albedo of the aerosol layer. The single scattering albedo is similar on the 2 days even though the optical depth for the aerosol layer was quite different. The aerosol single scattering albedo was between 0.85 and 0.90 at 350 nm, decreasing to 0.6 in the near infrared. The magnitude and decrease with wavelength of the single scattering albedo are consistent with the absorption properties of small black carbon particles. We estimate the uncertainty in the single scattering albedo due to the uncertainty in the measured fractional absorption and optical depths. The uncertainty in the single scattering albedo is significantly less on the high-optical-depth day (6 September) than on the low-optical-depth day (24 August). On the high-optical-depth day, the uncertainty in the single scattering albedo is 0.02 in the midvisible whereas on the low-optical-depth day the uncertainty is 0.08 in the midvisible. On both days, the uncertainty becomes larger in the near infrared. We compute the radiative effect of the aerosol by comparing calculations with and without the aerosol. The effect at the top of the atmosphere (TOA) is to cool the atmosphere by 13 W/sq m on 24 August and 17 W/sq m on 6 September. The effect on the downward flux at the surface is a reduction of 57 W/sq m on 24 August and 200 W/sq m on 6 September. The aerosol effect on the downward flux at the surface is in good agreement with the results reported from the Indian Ocean Experiment (INDOEX).

Author

Radiative Transfer; Atmospheric Effects; Aerosols; Near Infrared Radiation; Solar Flux

20070002783 NASA Ames Research Center, Moffett Field, CA, USA

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus

Wendisch, Manfred; Pilewskie, Peter; Pommier, John; Howard, Steve; Yang, Ping; Heymsfield, Andrew J.; Schmitt, Carl G.; Baumgardner, Darrel; Mayer, Barnhard; Journal of Geophysical Research; February 4, 2005; ISSN 0148-0227; Volume 110; 18 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NCC2-1391

Report No.(s): Paper-2004JD005294; Copyright; Avail.: Other Sources

Profiles of in situ measurements of ice crystal size distribution of subtropical cirrus were used to calculate solar spectral irradiances above and below the clouds. Spheres and nonspherical ice crystal habits (columns, hollows, plates, bullets, and aggregates) were assumed in the calculations. The simulation results were compared to irradiance measurements from the NASA Solar Spectral Flux Radiometer. The microphysical and radiation data were collected by three aircraft during CRYSTAL-FACE. Two cirrus cases (optical thickness of about 1 and 7) from two mission dates (26 and 23 July 2002) were investigated in detail. The measured downwelling and upwelling irradiance spectra above the cirrus could mostly be reproduced by the radiation model to within +/- 5-10% for most ice crystal habits. Below the cirrus the simulations disagreed with the measured irradiances due to surface albedo variability along the flight track, and nonoptimal colocation between the microphysical and irradiance measurements. The impact of shape characteristics of the crystals was important for the reflected irradiances above the optically thin cirrus, especially for small solar zenith angles, because in this case single-scattering dominated the solar radiation field. For the cirrus of moderate optical thickness the enhanced multiple scattering tended to diminish particular shape features caused by nonspherical single-scattering. Within the ice absorption bands the shape-related differences in the absorption characteristics of the individual nonspherical ice crystals were amplified if multiple scattering prevailed. Furthermore, it was found that below the cloud the shape sensitivity of the downwelling irradiance spectra is larger compared to the nonsphericity effects on reflected irradiances above the cirrus. Finally, it was shown that the calculated cirrus solar radiative forcing could vary by as much as 26% depending on the ice crystal habit.

Author

Crystals; Ice; Irradiance; Shapes; Solar Radiation; Cirrus Clouds; Temperate Regions

20070002879 California Univ., San Diego, La Jolla, CA, USA

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific

January 2006; 8 pp.; In English

Report No.(s): DE2006-885083; No Copyright; Avail.: Department of Energy Information Bridge

Research results presented. Topics: Greenhouse warming of the ocean; Western U.S. hydrologic variations; Indonesian Throughflow; The Pacific Decadal Oscillation in a coupled model; and Analysis of decadal changes in the tropics in the PCM. NTIS

Climate; Diagnosis; Greenhouse Effect; Low Frequencies; Oceans; Predictions; Research Management

20070002880 Lawrence Livermore National Lab., Livermore, CA USA

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations

Mirocha, J. D.; Kosovic, B.; Jan. 19, 2006; 8 pp.; In English

Report No.(s): DE2006-885125; UCRL-CONF-218272; No Copyright; Avail.: Department of Energy Information Bridge

The analysis of surface heat fluxes and sounding profiles from SHEBA indicated possible significant effects of subsidence on the structure of stably-stratified ABLs (Mirocha et al. 2005). In this study the influence of the large-scale subsidence rate on the stably stratified atmospheric boundary layer (ABL) over the Arctic Ocean during clear sky, winter conditions is investigated using a large-eddy simulation model. Simulations are conducted while varying the subsidence rate between 0, 0.001 and 0.002 ms^(sup -1), and the resulting quasi-equilibrium ABL structure and evolution are examined. Simulations conducted without subsidence yield ABLs that are deeper, more strongly mixed, and cool much more rapidly than were observed. The addition of a small subsidence rate significantly improves agreement between the simulations and observations regarding the ABL height, potential temperature profiles and bulk heating rates. Subsidence likewise alters the shapes of the surface-layer flux, stress and shear profiles, resulting in increased vertical transport of heat while decreasing vertical momentum transport. A brief discussion of the relevance of these results to parameterization of the stable ABL under subsiding conditions in large-scale numerical weather and climate prediction models is presented.

NTIS

Arctic Ocean; Atmospheric Boundary Layer; Boundary Layers; Climatology; Forecasting; Large Eddy Simulation; Ocean Surface; Strata; Subsidence; Turbulence

20070003082 Army Research Lab., White Sands Missile Range, NM USA

High Resolution Electro-Optical Aerosol Phase Function Database PFNDAT2006

SHirkey, Richard C\g; Tofsted, David H; Aug 2006; 59 pp.; In English

Report No.(s): AD-A458924; ARL-TR-3877; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458924>; Avail.:

CASI: [A04](#), Hardcopy

The High Resolution Phase Function Database (PFNDAT) 2006 consists of a series of wavelength dependent phase functions, single scattering albedos, extinction coefficients, and asymmetry parameters for ten naturally occurring and four manmade aerosols along with brief descriptions of the scattering parameters, concentrations, and aerosol size distribution characteristics. The naturally occurring aerosols consist of maritime, urban, rural, tropospheric, fog, rain, snow, and dust aerosols; a wind-lofted desert aerosol; and the Navy Aerosol Model (NAM). The manmade aerosols consist of dust produced from high-explosive munitions, white phosphorus, fog oil, and hexachloroethane smokes. Many of the models are functions of relative humidity (RH), wind speed, and other parameters. The database includes information at wavelengths from 0.20 to 40.0 m, dependent on the availability of index of refraction data for each scattering species. PFNDAT2006 includes all PFNDAT2005 aerosols at increased angular and wavelength resolution: 153 angles versus the previous 65 angles. Additional information is provided for the NAM, and radiative transfer calculations are presented comparing the new Henyey-Greenstein snow phase function with the traditional Mie generated phase function. We corrected the following errors: the refractive index of white phosphorus at 1.06 m and 0%RH; all tropospheric aerosol values were calculated at 99% RH; and the snow phase functions were missing at 10.0 m and had two values for 11.0 m. Improvements include updated refractive indices for dust and wind-lofted desert aerosols. These and other minor changes have resulted in improved values. All updated values are included in the 65-angle version of PFNDAT2005 on the CD.

DTIC

Aerosols; Albedo; Data Bases; Dust; Electro-Optics; Fog; High Resolution; Refractivity; Snow

20070003338 Air Force Research Lab., Rome, NY USA

Cognitive Network Computer for Atmospheric Monitoring

Holzhauser, Douglas; Oct 2006; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-459T

Report No.(s): AD-A459408; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459408>; Avail.: CASI: [A03](#), HC

The Air Force has an interest in advanced technology development aimed at monitoring environmental conditions. Weather is one specific environmental condition of significant interest to the military since it affects so many missions. Knowledge of atmospheric conditions in general, and knowledge about specific weather conditions in mission-critical regions, can be very beneficial to operational forces. However, specific atmospheric conditions are not always easy to obtain. Furthermore, timely processing and interpretation of weather data are critical issues. Current technologies can be used to provide information to users, but in order for it to be most useful, the information must be organized and managed in a timely fashion. Newer technologies related to cognitive science may process information into more significant and useful entities, toward the production of higher level concepts and knowledge. We describe a network of computationally rich sensor nodes grouped into small clusters and communicating with a console and then to the user (meteorologist).

DTIC

Artificial Intelligence; Cognition; Computer Networks; Computers; Environmental Monitoring; Meteorological Parameters; Radiotelephones

48

OCEANOGRAPHY

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics; and marine resources. For related information see also *43 Earth Resources and Remote Sensing*.

20070002122 Army Engineer Research and Development Center, Vicksburg, MS USA

Monitoring Completed Navigation Projects, Lessons Learned IV

Bottin, Jr , Robert R; Mar 2000; 9 pp.; In English

Report No.(s): AD-A458601; CETN-VI-33; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458601>; Avail.:

CASI: [A02](#), Hardcopy

The Coastal Engineering Technical Note (CETN) herein provides a summary of lessons learned and significant results for projects monitored under the Monitoring Completed Navigation Projects (MCNP) Program.

DTIC

Navigation; Engineering

20070003461 Shanghai Astronomical Observatory, China

Ocean Tide Models Performance in Coastal Regions

Yu, Nanhua; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 17-25; In English; See also 20070003451; Copyright; Avail.: Other Sources

Ocean tides play a significant role in climate due to its complex interactions between ocean, atmosphere, and sea ice. Tides have strong effects on circulations near coastal regions or on continental shelves. Tidal currents create turbulent mixing, tidal dissipation and internal tidal mixing affects general circulation and oceanic transport and thus climate. The first comprehensive ocean tide model is developed in 1980 by E. Schwiderski, the availability of the TOPEX/POSEIDON spaceborne radar altimeter observations has allowed development of more than 10 improved barotropic tide models in 1995, and the same number of further improved models by 2005. The TOPEX/POSEIDON global barotropic ocean tide models developed during 1994 - 1996 have been assessed as with accuracy of 2 - 3 cm rms in the deep ocean, a spatial resolution on the order of 50 km, and with significantly degraded accuracy near coastal regions. The next generations of ocean tide models are now available taking advantage of more than 6 years of TOPEX/POSEIDON (T/P) altimeter data and more sophisticated hydrodynamical modeling and associated assimilation techniques. Potential improvement in the tide model includes mitigation of tide aliasing, improved accuracy in the long-period tides and in the coastal regions. This study has been conducted to assess the current ocean tide model prediction capability primarily in the global coastal region, especially in the coastal region of China seas. Independent data including pelagic tidal constants from bottom gauges, and radar altimeter and crossover measurements were used. One application of this study is for sea level studies. More than six global ocean tide models have been evaluated and preliminary results indicate significant errors in the coastal seas still remain. The improved knowledge of tides allows interdisciplinary studies including the lunar deceleration caused by tidal frictions as well as geophysical studies of Earth's internal structure.

Author

Ocean Models; Tides; Continental Shelves; Climate; Poseidon Satellite; Barotropism; Air Water Interactions; Air Sea Ice Interactions; Radio Altimeters; Oceans

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*.

20070002133 Massachusetts Inst. of Tech., Cambridge, MA USA

Cellular Gate Technology

Knight, Thomas F; Sussman, Gerald J; Jan 1998; 16 pp.; In English

Contract(s)/Grant(s): N00014-96-1-1228; DABT63-95-C130

Report No.(s): AD-A458730; No Copyright; Avail.: CASI: [A03](#), Hardcopy

We propose a biochemically plausible mechanism for constructing digital logic signals and gates of significant complexity within living cells. These mechanisms rely largely on co-opting existing biochemical machinery and binding proteins found naturally within the cell, replacing difficult protein engineering problems with more straightforward engineering of novel combinations of gene control sequences and gene coding regions. The resulting logic technology, although slow, allows us to engineer the chemical behavior of cells for use as sensors and effectors. One promising use of such technology is the control of fabrication processes at the molecular scale.

DTIC

Logic Circuits; Cells (Biology); Sequential Control; Chemical Reactions

20070002509 NASA Johnson Space Center, Houston, TX, USA

Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection

Suderman, M. T.; McCarthy, M.; Mossell, E.; Watts, D. M.; Peters, C. J.; Shope, R.; Goodwin, T. J.; June 2006; 40 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): 279-00-0308

Report No.(s): NASA/TP-2006-213723; S-980; Copyright; Avail.: CASI: [A03](#), Hardcopy

A three-dimensional (3-D) tissue-like assembly (TLA) of human bronchial-tracheal mesenchymal (HBTC) cells with an

overlay of human bronchial epithelial (BEAS-2B) cells was constructed using a NASA Bioreactor to survey the infectivity of SARS-CoV. This TLA was inoculated with a low passage number Urbani strain of SARS-CoV. At selected intervals over a 10-day period, media and cell aliquots of the 3-D TLA were harvested for viral titer assay and for light and electron microscopy examination. All viral titer assays were negative in both BEAS-2B two-dimensional monolayer and TLA. Light microscopy immunohistochemistry demonstrated antigen-antibody reactivity with anti-SARS-CoV polyclonal antibody to spike and nuclear proteins on cell membranes and cytoplasm. Coronavirus Group 2 cross-reactivity was demonstrated by positive reaction to anti-FIPV 1 and anti-FIPV 1 and 2 antibodies. TLA examination by transmission electron microscopy indicated increasing cytoplasmic vacuolation with numerous electron-dense bodies measuring 45 to 270 nm from days 4 through 10. There was no evidence of membrane blebbing, membrane duplication, or fragmentation of organelles in the TLAs. However, progressive disruption of endoplasmic reticulum was observed throughout the cells. Antibody response to SARS-CoV specific spike and nucleocapsid glycoproteins, cross-reactivity with FIPV antibodies, and the cytoplasmic pathology suggests this HBTE TLA model is permissive to SARS-CoV infection.

Author

Antigens; Bronchi; Transmission Electron Microscopy; Membranes; Proteins; Organelles; Bioreactors

20070002967 NASA Ames Research Center, Moffett Field, CA, USA

The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics

Smith, Jason M.; Green, Stefan J.; Moisaner, Pia; Roberts, Kathryn J.; Francis, Chris; Prufert-Bebout, Leslie; Bebout, Brad M.; [2006]; 2 pp.; In English; AbSciCon, 26 Mar. 2006, Washington, DC, USA

Contract(s)/Grant(s): 21-344-58; Copyright; Avail.: Other Sources; Abstract Only

The record of life on the only planet where it is known to exist is contained in the biogeochemical processes that organisms catalyze for their survival, in the compounds that they produce, and in their phylogenetic (evolutionary) relationships to each other. We manipulated sulfate and nutrient concentrations in intact microbial mats over periods of time up to a year. The objectives of the manipulations were: 1) characterize the diversity of process-associated functional genes; 2) understand environmental conditions leading to shifts in microbial guilds; 3) monitor/identify competitive responses of organisms sharing a metabolic niche. Characterization of functional genes associated with carbon (*mcrA*), nitrogen (*nifH*, *nirK*) and sulfur (*dsrKb*) cycling performed to date provided insight into the diversity and metabolic potential of the system; however, we only identified broad scale correlations between gene abundances and changes in mat physiology. For instance, increases in methane production by mats subjected to lowered sulfate and salinity concentrations were correlated with an observed increase in abundance of hydrogenotroph-like *mcrA* genes. However, due to low sequence similarity to any cultured isolates, phylogenetic associations only allow order level taxonomic commentary, preventing any associations being made on the cellular level. In each of the genes characterized from these experiments, a significant portion of sequences recovered show minimal phylogenetic affiliation to cultured organisms, preventing any understanding of inter-community dynamics and the functional capacities of these unknown organisms. Environmental genomics may provide insight into mat systems by allowing the correlation of functional genes with phylogenetic markers.

Author

Biogeochemistry; Genes; Genome; Microorganisms

20070003017 Naval Health Research Center, San Diego, CA USA

Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002

Campbell, Katherine M; Vaughn, Andrew F; Russell, Kevin L; Smith, Besa; Jimenez, Dinice L; Barrozo, Christopher P; Minarcik, John R; Crum, Nancy F; Ryan, Margaret A; Dec 23, 2003; 21 pp.; In English

Report No.(s): AD-A458825; NHRC-04-05; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458825>; Avail.:

CASI: A03, Hardcopy

An outbreak of community-acquired methicillin-resistant Staphylococcus aureus (CA-MRSA) skin infections was observed in a population of US military trainees in the summer of 2002. A questionnaire was developed and administered to 209 trainees, 22 of whom had MRSA infections. Factors associated with infection were described by multivariable logistic regression modeling, and included having a roommate in training with a prior skin infection (odds ratio [OR] = 3.44), or having a family member or friend who worked in a healthcare setting (OR = 2.79). Previous antibiotic use, hospitalization, or health problems were not associated with MRSA infection. This outbreak of MRSA skin infections in an otherwise healthy, well-defined, military population provided an opportunity to describe risk factors for CA-MRSA, which may help focus prevention efforts in this and other communities.

DTIC

Infectious Diseases; Military Personnel; Public Health; Risk; Staphylococcus

20070003030 California Univ., Santa Barbara, CA USA

Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation

Munsky, Brian; Peles, Slaven; Khammash, Mustafa; Jan 2006; 8 pp.; In English

Contract(s)/Grant(s): DAAD19-03-D-0004

Report No.(s): AD-A458856; CCD-06-1201; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458856>; Avail.:

CASI: [A02](#), Hardcopy

Considerable recent experimental evidence suggests that significant stochastic fluctuations are present in gene regulatory networks. The investigation of stochastic properties in genetic systems involves the formulation of a mathematical representation of molecular noise and devising efficient computational algorithms for computing the relevant statistics of the modeled processes. However, the complexity of gene regulatory networks poses serious computational difficulties and makes any quantitative prediction a difficult task. Monte Carlo based approaches are typically used in study of complex stochastic systems, but they often suffer from long computation times, slow convergence, and offer little analytic insight. The recently proposed Finite State Projection (FSP) approach provides an analytical alternative that avoids many of the shortcomings of Monte Carlo methods, but thus far it has only been demonstrated for a certain class of problems. In this paper we show that the applicability of the finite projection approach can be enhanced by taking advantage of tools from the fields of modern control theory and dynamical systems. In particular, we present an approach that utilizes singular perturbation theory in conjunction with the Finite State Projection approach to improve the computation time and facilitate model reduction. We demonstrate the effectiveness of the resulting slow manifold FSP algorithm on a simple example arising in the cellular heat shock response mechanism.

DTIC

Genes; Mathematical Models; Perturbation; Stochastic Processes

20070003036 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

The Effect of Feedback on Penile Tumescence in Sexually Functional Men

Galbreath, Nathan W; Jan 6, 2003; 216 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458864; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458864>; Avail.: CASI: [A10](#),

Hardcopy

Male erectile disorder (ED) impacts the sexual functioning of ten to twenty million men in the USA. Erectile disorder, as with other sexual dysfunctions, may be caused by, or associated with a number of diseases that impact the cardiovascular and nervous systems. However, men who have few physical problems may also experience the disorder due to psychological factors. Men who suffer from ED due to psychogenic factors are believed to differ from functional men in five key cognitive and behavioral domains. Barlow and Sbrocco (1996) used these differences to formulate a model of male sexual dysfunction that explicitly addresses the cognitive mechanisms involved in ED. The model proposes that a key point in the development of ED is whether or not a man feels challenged or threatened when experiencing a discrepancy between expected and actual performance. Men who are challenged by the experience typically have the skills necessary to identify and alleviate the discrepancy in performance. They are believed to use positive outcome expectancy and confidence to overcome suboptimal sexual performance and maintain function. In contrast, men who are threatened by discrepancies between expected and actual performance may expect a negative outcome and have little faith in their ability to sexually perform.

DTIC

Feedback; Human Beings; Males; Sex

20070003038 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians

Oates, Christie S; Jan 2006; 97 pp.; In English

Report No.(s): AD-A458866; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458866>; Avail.: CASI: [A05](#),

Hardcopy

The purpose of the present study was to identify whether there are unique biological, behavioral, psychological, and environmental factors specific to African-Americans that may promote the development of obesity. Chronic stress levels and the hormonal and metabolic responses of 63 Caucasian and African-American men and women to two metabolically-relevant events -- a metabolic load (standardized meal) and a metabolic demand (standardized exercise) were assessed. The hormonal and metabolic responses included hypothalamic-pituitary-adrenal axis hormones (i.e., adrenocorticotropin hormone and cortisol) and insulin responses to a meal. African-Americans reported higher levels of perceived chronic stress, but had lower plasma levels of the stress hormone cortisol than did Caucasians at baseline and throughout both testing sessions. Acute insulin responses and total insulin production to a meal were significantly higher among African-Americans compared to Caucasians.

Striking ethnic differences emerged in the psychological factors that mediate responses to stress and predict health behaviors, such that African-Americans reported less social support, less rest/sleep, and more negative appraisal than Caucasians. Overall, the biological (i.e., acute insulin responses and total insulin production in response to a meal) and psychological findings (i.e., higher chronic stress, less social support, less rest/sleep, and more negative appraisal) in overweight but otherwise healthy African-Americans compared to healthy, overweight Caucasians suggest a high vulnerability for the early onset of metabolic disorders such as obesity.

DTIC

Africa; Metabolism; Obesity; Races (Anthropology)

20070003041 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts

Riffle, Judy S; Mar 2, 2006; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0332

Report No.(s): AD-A458869; VT4-30144; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458869>; Avail.: CASI: A02, Hardcopy

We have developed a productive alliance with Drs. Kaminski and Mertz from the Argonne National Laboratories and with Dr. Rosengart from the University of Chicago, who have designed a unique, portable, blood detoxification device with the goal of magnetically filtering undesirable components from the blood stream. Our group has supported their DARPA-AFOSR project entitled Biohazard Detoxification Method Utilizing Magnetic Particles by providing materials and materials guidance. Our focus during the current year has been on achieving biodegradable nanospheres in the 100-500 nm diameter size range which contain high concentrations of magnetite. The current status of this work is that we have poly(D,L-lactide) nanospheres which contain 40 weight percent magnetite. The average nanosphere diameter is approximately 80-90 nm. We have incorporated one weight percent of a 2k-20k Mn poly(ethylene oxide-b-D,L-lactide) block copolymer into the nanospheres in efforts to achieve hydrophilic surfaces. The current focus is on (1) learning how to increase the nanosphere size slightly to achieve 100-500 nm particles, (2) achieving even higher concentrations of magnetite, and (3) understanding how to achieve surfaces sufficiently covered with poly(ethylene oxide) with this nanosphere process to avoid immune response. We will collaborate with Kaminski/Mertz/Rosengart to relate nanosphere composition and processing to immune response.

DTIC

Biomagnetism; Blood; Magnetic Moments; Magnetite; Nanotechnology

20070003045 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats

Tomchesson, Joshua L; Mar 31, 2006; 231 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458876; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458876>; Avail.: CASI: A11, Hardcopy

Excessive body weight, particularly in children, is a growing concern in the USA and around the world. Body weight is affected by feeding behavior and physical activity. Environmental factors affect feeding behaviors and physical activity; therefore, environment is an important influence on body weight. Three separate experiments examined the behavioral effects of environmental enrichments on feeding, activity, and body weight. For the first two experiments, subjects were 36 adolescent, male (Experiment I) and 36 adolescent female (Experiment II) Sprague-Dawley rats. Experiment III examined the behavioral effects of enrichment on 24 male and 24 female adolescent Sprague-Dawley rats. Responses to environmental enrichment included: body weight (BW), Body Mass Index score (BMI), Lee Index score (LI), consumption of standard rat chow, Oreo cookies, and Lays potato chips, and physical activity (PA) in the animal's home cage (HCA) and in an open field (OF). The major findings from these experiments were that: 1) environmental enrichment results in lower body weight, 2) environmental enrichment decreased food consumption, especially the bland foods, 3) animals housed in environmental enrichment were less active in novel surroundings and were more active in their home cages compared to animals in non-enriched housing, and 4) males and females responded similarly to environmental enrichment with regard to body weight, feeding, and physical activity. These findings highlight the importance of the effects of housing conditions in animal research and suggest ways to help control body weight in animals and humans.

DTIC

Body Weight; Enrichment; Environments; Females; Food Intake; Males; Rats; Responses

20070003068 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions

Rogers, Heather L; Jan 2006; 80 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458908; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458908>; Avail.: CASI: A05,

Hardcopy

Essential hypertension (EH) is associated with cognitive deficits, and higher blood pressure levels have been related to lower levels of cognitive function. Executive functions, speed of processing, memory and attention are especially impacted. Hypertension may affect cognitive function because of pathological physiological changes in the brain (e.g., white matter lesions and/or lacunar infarctions) or behavioral/emotional alterations associated with hypertension (e.g., stress, anxiety, and depression). (1) Rule out white matter lesions and lacunar infarctions as necessary causes of cognitive deficits in EH; (2) Examine the role of anxiety and depression as a potential mechanism for the relationship between EH and cognitive function; and (3) Determine socio-demographic and medical moderators of this relationship in individuals without structural brain changes. Ninety five Chinese with EH and 95 age- and education-matched normotensive controls were recruited into the study. All participants had a medical history interview and physical exam, completed Zung's Anxiety and Depression Surveys, and completed the Mini-Mental State Examination (MMSE) and a computerized neuropsychological battery. All participants had an MRI scan of the brain. For the present study, individuals with white matter lesions or lacunar infarctions were excluded from analysis. The remaining sample consisted of 46 hypertensives and 66 controls. Multivariate analyses, controlling for medical/risk factor differences between hypertensive and normotensive groups, revealed no relationship between EH and cognitive function nor EH and emotional status. Two-factor ANOVAs revealed significant EH x Gender interactions for digit discrimination response time ($p < 0.01$) and the MMSE ($p < 0.05$). The present findings suggest that gender moderates the influence of hypertension on cognitive function in the absence of structural brain changes.

DTIC

Age Factor; Brain; China; Cognition; Emotional Factors; Hypertension; Imaging Techniques; Infarction; Lesions; Magnetic Resonance; Mental Health; Patients

20070003074 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera: Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA

Florin, David A; Jul 5, 2006; 293 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458914; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458914>; Avail.: Defense Technical Information Center (DTIC)

Morphometric and molecular analyses were used to elucidate the variation among the sand fly *Lutzomyia shannoni* collected from seven widely separated locations in the southeastern USA: Baton Rouge, LA; Fort Bragg, NC; Fort Campbell, KY; Fort Rucker, AL; Ossabaw Island, GA; Patuxent NWRR, MD; and Suwannee NWR, FL. *L. shannoni* is a wide-ranging phlebotomine sand fly that has been implicated in the transmission of a number of parasitic and viral pathogens of medical/veterinary importance. In light of this, it is imperative to answer the question of whether or not significant variation exists among the purported biogeographical populations so as to make a determination on the possibility of a cryptic species complex. A balanced approach to answering this question was emphasized by using the two-prong method of morphological and molecular data. The morphometric analysis entailed using univariate and multivariate techniques on a sample size of 40 males and 40 females from each collection site (with the exceptions, due to inadequate number of collected specimens, of Baton Rouge where morphometrics were not conducted for the specimens of either gender and of Suwannee NWR where morphometrics were not conducted on the male specimens). A total of 54 characters from the male specimens and 49 characters from the female specimens were measured by an inserted micrometer in the ocular eyepiece of a compound microscope. Results indicate that while there is a certain amount of variation, it is not sufficient to discriminate among the collection sites. Two molecular markers, the mitochondrial DNA CO I and the nuclear DNA ITS2, were PCR-amplified and the resulting sequences compared. For both markers, the small amount of variation observed in the sequences did not have a diagnostic distribution and were not informative in distinguishing the specimens based upon collection site.

DTIC

Fever; Infectious Diseases; Measurement; Molecular Structure; Sands; United States; Viruses

20070003075 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity

Lee, Katherine S; Jul 6, 2006; 140 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458915; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458915>; Avail.: CASI: A07, Hardcopy

Streptococcus pneumoniae (Pn) remains the primary cause of community-acquired pneumonia throughout the world, leading to high morbidity and mortality rates in the young and elderly. A better understanding of the host response to the organism would aid in the development of more effective antibiotics and vaccines. Toll-like receptors (TLRs) play an important role in the initial recognition of pathogens by binding conserved moieties known as pathogen associated molecular patterns (PAMPs). This interaction is translated through the induction of signaling cascades that ultimately results in the production of various chemical mediators necessary for the activation of the adaptive arm of the immune response. Presentation of processed antigen in the context of major histocompatibility complex (MHC) by antigen presenting cells occurs, leading to effective help by primed T cells (T(eff)) to naive B cells in a process known as linked recognition. The activation and proliferation of B cells into mature plasma cells results in the development of appropriate antibody responses that are critically important in the clearance of extracellular bacteria such as Pn. These responses, however, need to be modulated so that inappropriate immune activation does not lead to anergy or over-responsiveness. The naturally occurring thymic population of CD4+CD25+ regulatory T cells (Tregs) survey and monitor the actions of T(eff) to prevent such inappropriate responses. In the following dissertation, I have used a murine model to study the host response to Pn. Specifically, I have focused on previous findings in the lab that suggested a possible role for Tregs as well as TLRs in our model system. I found that Tregs do not appear to play a part in modulating acute humoral responses to a bacterial pathogen such as Pn.

DTIC

Immunity; Physiological Responses; Pneumonia; Streptococcus

20070003086 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Human Immunodeficiency Virus Type 1 (HIV-1) Viral Protein R (Vpr)-Mediated Cell Cycle Arrest: An Analysis of Current Mechanistic Models

Sercovich, Mark J; Jun 8, 2006; 90 pp.; In English

Report No.(s): AD-A458930; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458930>; Avail.: CASI: A05, Hardcopy

Human immunodeficiency virus type I (HIV-1) infection causes acquired immunodeficiency syndrome (AIDS), the most globally devastating viral disease of the past 25 years. Development of effective HIV-1 preventative and therapeutic regimens have proven exceedingly difficult, as the virus has evolved sophisticated mechanisms for thwarting control efforts. A detailed understanding of HIV-1 molecular biology is therefore necessary in order to generate the effective and inexpensive prevention and treatment strategies required for AIDS pandemic curtailment. HIV-1 optimizes its transmissibility and propagation through continual change and coordination of its components' functions and life cycle processes with one another and with those of cellular components and processes. Comprehending the molecular bases for HIV-1's abilities to manipulate host cell components and processes is key to the identification of the virus's vulnerabilities. This thesis focuses on one identified effect, G2/M cell cycle arrest induction (1-5), of one highly conserved HIV-1 component, viral protein R (Vpr) (6, 7). A mechanistic understanding of this function is important because arrest at this cell cycle stage provides a selective advantage for the virus: transcription from the viral promoter more active during G2, allowing for increased viral replication (8- 14). Other reasons for the selective advantage of G2/M arrest, e.g. prevention or delay of cell death by mitotic catastrophe or apoptosis, are also possible (3, 15-23). Covering scientific publications through November 2005, this thesis explores the state of knowledge of the mechanism(s) underlying Vpr's ability to induce G2/M cell cycle arrest. The author's goal is to provide a disinterested analysis of the available mechanistic models and their supporting data with the hope of being helpful to the reader in some manner.

DTIC

Human Immunodeficiency Virus; Proteins; Viruses

20070003105 California Univ., Berkeley, CA USA

Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells

Xu, Ren; May 2006; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0441

Report No.(s): AD-A458962; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458962>; Avail.: CASI: A03, Hardcopy

Cell-Extracellularmatrix (ECM) adhesions structurally alter the cells as well as provide signals critical for the cell differentiation and tissue-specific gene transcription. We show showed that the ECM induce global deacetylation of his tones H3 and H4 in human breast epithelial cells and that this deacetylation correlated with a global reduction in gene expression. To determine how chromatin structure regulates differentiated gene expression in 3D culture we used mammary-specific case in genes as models. We identified that transcription factors Stat5 and CIEBP beta were regulated by ECM. Chromatinimmunoprecipitation(ChIP) assays demonstrated that levels of acetylated histones as well as binding of Stat5 and CIEBP betain the case inpromoters increased in response to ECM and prolactin treatment. However trichostatin A(TSA)-induced histoneacetylation failed to activate-case in expression suggesting that histoneacetylationis not sufficient for the gene transcription. Introduction of adominantnegative Brg 1 significantly reduced both beta-andgamma-casein expression indicating that ATP-depend entchromatinremodeling is required for transcription of these two milk proteingenes. Thus ECM-and prolactin-regulated transcription of the mammary-specific case in genes requires the concertedaction of histoneacetylation ATP-depend entchromatinre modeling and activation of transcription factors.

DTIC

Chromatin; Loci; Mammary Glands; Proteins

20070003107 Rice Univ., Houston, TX USA

Signaling Pathways Controlling the Growth and Proliferation of Drosophila Perineurial Glial Cells

Sterm, Michael; May 2006; 12 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0651

Report No.(s): AD-A458973; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458973>; Avail.: CASI: A03,

Hardcopy

The long term goals of this research are to understand the mechanisms by which NF1 controls growth using the Drosophila peripheral nerve. This system is advantageous because we can apply a number of powerful molecular genetic methodologies that are not available in other systems. The aims of this project address three specific aspects of growth control. In our first aim we asked if NF1 acts downstream of a G protein to exert its effects. Although we have found that overexpression of amnesiac (amn) and Gas each enhance the effects on glial growth of expression of RasVi2 no equivalent effect of NF1 overexpression was observed. These data support the hypothesis that amn acts through Gas and presumably PKA to promote perineurial glial growth. However a role for NF1 in this process is currently unclear. In our second task we proposed to test further the hypothesis that increased neurotransmitter release from motor neurons (or increased neurotransmitter persistence) affects perineurial glial growth. All data collected for this task was negative. For task three we found hat the formation of extra perineurial cells is conferred by either the NF1 P2 null mutation or by peripheral glial RasVi 2 expression.

DTIC

Drosophila; Genetics

20070003108 Pennsylvania State Univ., University Park, PA USA

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery

Smith, Nadine; Pishko, Michael; Gabbay, Robert; Werner, Jacob; Sep 2006; 230 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0617

Report No.(s): AD-A458974; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458974>; Avail.: Defense Technical Information Center (DTIC)

Numerous studies have shown that ultrasound can successfully be used for noninvasive blood glucose monitoring and transdermal insulin delivery. To facilitate the ability of a diabetic patient to avoid repeated needle sticks to monitor blood glucose level and painful daily injections of insulin, this basic research proposal will study the feasibility of safe and portable ultrasonic system to do both. Specifically using the low profile and light weight 'cymbal' transducer, a potentially portable ultrasound array of will be designed. Moreover the feasibility of a 'smart' diabetes management system will be developed to control both the glucose monitoring and insulin delivery system. The report herein describes the year one progress for this award and there are no deviations from the original research plan and this research is progressing on schedule.

DTIC

Detection; Feedback Control; Glucose; Insulin; Metabolic Diseases; Ultrasonics

20070003111 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease

Shafer, Sarah T; Aug 2006; 104 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458977; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458977>; Avail.: Defense Technical Information Center (DTIC)

The present experiment examined the effects of environmental enrichment and stress on behavioral and biological measures relevant to cardiovascular disease risk (i.e. plasma corticosterone levels elevated plus maze locomotor activity in an open field chamber body weight and food consumption and heart morphology). Seventy-two Sprague-Dawley rats were raised in enriched environments (social or social and physical enrichment) or non-enriched environments for a total of 48 days. Half of the animals were placed in stress conditions in which they received 14 days (20 minutes/day) of restraint stress and the other half of the animals were placed in a no-stress condition.

DTIC

Biological Effects; Cardiovascular System; Heart Diseases; Males; Rats

20070003113 Pennsylvania State Univ., University Park, PA USA

Microfabricated Multianalyte Sensor Arrays for Metabolic Monitoring

Pishko, Michael V; Sep 1, 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0780

Report No.(s): AD-A458979; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458979>; Avail.: CASI: A03, Hardcopy

Glucose sensor arrays were fabricated on gold electrodes on flexible polyimide sheets by cross-linking glucose oxidase and redox polymer using UV-initiated free radical reaction. Using conventional silicon fabrication methods, five-element array Au microdisks were initially fabricated using mid-UV photolithography. Active glucose oxidase was entrapped in hydrogel by UV-initiated photo polymerization with poly(ethylene glycol) diacrylate or PEG-DA on the array electrodes. The fabricated microarray sensors were individually addressable and with no cross-talk between adjacent array elements as assessed using cyclic voltammetry. We have fabricated an array of glucose sensors on flexible polyimide sheets that exhibit the desired linear response in the biological range. We have also tested the sensors using other electrochemical methods including amperometry and square wave voltammetry (which is known for its background reduction).

DTIC

Glucose; Metabolic Diseases; Metabolism

20070003114 Baylor Coll. of Medicine, Houston, TX USA

A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains

Songyang, Zhou; Mar 2006; 8 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0233

Report No.(s): AD-A458980; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458980>; Avail.: CASI: A02, Hardcopy

BRCA1 C-terminal (BRCT) domains are novel phosphopeptide binding modules. Cancer-associated missense and deletion mutations have been found in the BRCT repeat regions of BRCA1, suggesting an essential role of BRCT domains in regulating BRCA1 activity. In addition, BRCT domains are found in many proteins that regulate DNA damage repair, cell cycle, and genome stability, implying a more global role of BRCT domains in genome stability surveillance. These results suggest that the BRCT domain acts as a sensor to protein phosphorylation in response to DNA damage, recruits phosphorylated cellular targets, and mediates signaling complex formation. However, the identities of the in vivo BRCT domain targets are largely unknown. In order to understand the role of phosphorylation in protein-protein interactions, we developed several approaches utilizing peptide libraries and peptide arrays. We propose to use these methods to systematically identify phosphoproteins that can interact with BRCT domains. In addition to potential new regulators of genome stability, the approaches can identify phosphorylated sequences on proteins that are important for DNA damage responses and cell cycle. Such information should prove valuable, especially for the development of new screening strategies, drug targets, and treatment for breast cancer.

DTIC

Domains; Genes; Phosphorylation; Proteome; Targets

20070003144 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

The Molecular Basis of Canavan Disease: Aspartoacylase Enzyme Characteristics

Hershfield, Jeremy R; Jan 2006; 200 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459028; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459028>; Avail.: CASI: A09, Hardcopy

Mutations in the gene for aspartoacylase (EC 3.5.1.15; ASPA), which catalyzes deacetylation of N-acetyl-L-aspartate (NAA), correlate with Canavan Disease (CD), a neurodegenerative disorder usually fatal during childhood. Defective ASPA activity has been linked to characteristically elevated NAA levels in the urine of CD patients, and ASPA knockout mice and ASPA deletion rats display CD-like symptoms. While efforts have focused on treating CD, there is limited evidence to support ASPA protein regulation. The ASPA enzyme is thought to be cytoplasmic. In this dissertation, we used immunohistochemistry to show ASPA within nuclei of rat brain oligodendrocytes, in rat kidney proximal tubule cells, and in cultured mouse and rat oligodendrocytes. Subcellular fractionation analysis from wild-type rats revealed low enzyme activity against NAA in nuclear fractions. While two recent reports have indicated that ASPA is a dimer, size-exclusion chromatography of both nuclear and cytoplasmic fractions showed ASPA is an active monomer. Since ASPA is small enough to passively diffuse through the nuclear pore complex, we constructed, expressed, and detected in COS-7 cells a green fluorescent protein-human ASPA fusion protein. The mixed nuclear-cytoplasmic localization of GFP-hASPA demonstrated that the subcellular localization of ASPA is regulated. We then investigated regulation of the ASPA protein at the structural level. A recent alignment study identified ASPA as a member of the carboxypeptidase A (CPA) family. Therefore, we developed and tested a three-dimensional homology model of ASPA based on CPA. Mutations of the putative zinc-binding residues (H21G, E24D, and H116G), the general proton donor (E178A), and mutants designed to switch the order of the zinc-binding residues (H21E/E24H and E24H/H116E) were created and expressed in COS-7 cells. Each mutation yielded wild-type ASPA protein levels, but undetectable ASPA activity. Finally, the analysis of several CD-associated ASPA mi

DTIC

Diseases; Enzymes; Molecular Properties

20070003145 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells

Contreras-Sesvold, Carmen; Jan 2006; 66 pp.; In English

Report No.(s): AD-A459029; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459029>; Avail.: CASI: A04, Hardcopy

Injury to the CNS elicits a rapid response from the injured environment. The most significant response is that from astrocytes which undergo an activation process and become reactive astrocytes. This causes phenotypic as well as functional changes to maintain the tissue integrity, protect adjacent areas, and enable repair processes. However, this process does impede axonal regeneration. Additionally, astrocytes clearly demonstrate the self-renewing multipotential. The function of glial dedifferentiation lends itself to increased study. Emerging data suggests glial cells must dedifferentiate to an astrocyte-like morphology before becoming capable of neural generation.

DTIC

Brain; Cells (Biology); Reaction Kinetics; Reactivity; Stem Cells

20070003153 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Amygdala, Anxiety and Alpha(1) Adrenoceptors: Investigations Utilizing a Rodent Model of Traumatic Stress

Manion, Sean T; Aug 23, 2006; 95 pp.; In English

Report No.(s): AD-A459042; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459042>; Avail.: CASI: A05, Hardcopy

Exposure to traumatic stress can result in post-traumatic stress disorder (PTSD), characterized by indicators including exaggerated acoustic startle response (ASR) and alterations in processing of emotional memory. Similar effects can be seen in an animal model of traumatic stress. The basolateral amygdala (BLA) is an area known to be involved in the processing of emotional memory and startle modulation. Synaptic plasticity in the BLA is thought to play a key part in this memory formation, and therefore can be involved in subsequent stress related pathologies. The first part of this project used this model of traumatic stress to investigate the effects of prazosin, an 1 adrenergic receptor (AR) antagonist, on stress induced elevation of ASR. This investigation sought to determine its effectiveness in reducing the effects of traumatic stress when given prior to stress. Male Sprague-Dawley rats were injected with 0.5 mg/kg iv of prazosin 30 minutes before inescapable tail shock on three consecutive days. ASR testing was performed 1, 4, 7 and 10 days post-stress and compared to baseline and control values. Results show a significant reduction of ASR hyperarousal in the pre-stress injection group. The second part of this

project sought to investigate 1A adrenoceptor involvement in long-term potentiation (LTP) in the BLA and to determine the effects of traumatic stress on this type of plasticity. In the BLA of control animals, the 1A AR specific agonist A61603 (1 M) completely abolished theta-burst stimulation-induced LTP. In animals previously exposed to a repeated restraint and tailshock stress protocol, only a partial reduction of LTP was detected in the presence of A61603. These findings suggest a possible mechanism contributing to the emotional memory in PTSD and support that the 1A ARs can be a specific pharmacological target in PTSD. Taken together, these findings offer both the possibility of preventative treatment for certain physiological symptoms of PTSD

DTIC

Anxiety; Rodents

20070003154 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses

Anthony, Robert M; Jan 2006; 114 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459045; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459045>; Avail.: Defense Technical Information Center (DTIC)

Effective immune responses to infectious diseases involve appropriate primary and secondary reactions mediating host protection. Th2 effector mechanisms leading to host-protection remain elusive. Using an infectious model employing a nematode parasite, *Heligmosomoides polygyrus*, we characterized the immune cell infiltrate surrounding invasive larval parasites in the small intestinal mucosa and submucosa (host:parasite interface) during early stages of a secondary infection. A primary is chronic, with established adult parasites detectable up to four months post infection, where as the parasites are naturally cleared from the intestinal lumen by 14 days follow challenge. This distinction between primary and secondary *H. polygyrus* infections allows a clear readout of protective immunity, making this infectious model useful for examining protective secondary Th2 responses. A distinct and highly reproducible leukocyte architecture developed by the fourth day post challenge, which included CD4+ T cells surrounding the parasite. Additionally, laser capture microdissected (LCM) samples from the host:parasite interface featured upregulated Th2 cytokine mRNAs relative to untreated intestinal tissue. This localized inflammatory response differed during primary infection, as CD4+ T cells did not infiltrate the host:parasite interface, and there were no increases in cytokine expression. These findings were extended to show that the peripheral inflammation during the memory Th2 response at the host:parasite interface is essential for host-protection leading to worm expulsion. Memory CD4+ T cells that express Th2 cytokines rapidly accumulate around the invading parasite and induce the alternative activation of macrophages. Alternatively activated macrophages metabolize the amino acid, arginine, by the enzyme arginase-1. Our findings demonstrate that macrophages and arginase contribute to the natural clearance of a secondary *H. polygyrus* infection.

DTIC

Gastrointestinal System; Immunology; Infectious Diseases; Parasites; Worms

20070003157 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

Investigation of the Basis for Persistent Porin Serotypes of *Neisseria Gonorrhoeae* in Community Infections

Garvin, Lotisha E; Jan 2006; 84 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459049; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459049>; Avail.: CASI: A05, Harcopy

Neisseria gonorrhoeae porin (por), a major outer membrane protein, has been studied extensively and is the basis of many gonococcal typing schemes. Epidemiological studies which utilize the porin-based typing method called variable region (VR) typing have shown certain VR types of the porB1A allele occur more frequently. We examine the hypothesis that certain porin types give strains a functional advantage. Alternatively, porin may just be a marker of more fit clones. To investigate the issue of clonality, we utilized pulsed field gel electrophoresis (PFGE). Isolates of the first and second most common VR types fell into a total of six different PFGE clusters, which were ~85% similar in band patterns. From these results, we concluded that a porin-mediated advantage may exist in these strains. The best characterized porin-mediated phenotype that may confer a fitness advantage is the capacity of some porins to mediate resistance to the bactericidal activity of normal human serum. The persistence of certain VR types among P1A strains of various ancestral backgrounds is evidence that certain porins may play an important role in survival or transmission, perhaps due to conferring increased resistance to host complement. An increased understanding of the role of porin in pathogenesis may provide invaluable insight into the success of certain strains within communities and the study of porin as a possible vaccine target.

DTIC

Infectious Diseases

20070003158 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA

The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya

Grills, Ardath W; Jan 2006; 102 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459051; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459051>; Avail.: CASI: A06, Hardcopy

To investigate the allelic complexity of infection (COI) of Plasmodium falciparum infections in children living in western Kenya, samples from three studies were analyzed. The longitudinal cohort, used to determine the baseline COI, followed 60 children 1-4 years old for 13 months. Results revealed a COI that was dependent on age, parasite density, illness, village location and bed net use. Nearly all infections were with multiple genotypes. Fluctuations of the three examined alleles of msp1, K1, MAD20 and RO33, were rapid and random within individual children, as well as the entire study group, indicating a highly diverse parasite population. Parasite density was found to be directly correlated with COI in those children with clinical illness. As the density increased, the contribution of the K1 allele proportionately increased while the contribution of the RO33 allele decreased. Presence of the invariable RO33 allele was also found to be mildly protective against clinical illness. For the first time, bed net use was found to decrease COI in 1-2 year old children who were both asymptomatic carriers of parasites and ill with clinical malaria; the RO33 allele was again most associated with the decrease in COI. In the phase 1 dose-escalation trial with 135 children, those participants who received the full vaccine dose had a decrease in COI following vaccine administration. In that group of children, the RO33 allele was identified in much greater prevalence following vaccine administration. Samples that were RO33 positive were also predominately chloroquine sensitive. The phase 2 vaccine trial with 400 participants is still currently blinded; initial analysis showed an increased COI in ill patients, a finding that contrasts with previous reports. Combined, the three studies provided evidence of the rapidly evolving immunity to malaria, even within the limited 1-4 year age range of the study participants.

DTIC

Antigens; Children; Epidemiology; Immune Systems; Infectious Diseases; Kenya; Parasitic Diseases

20070003203 Michigan Univ., Ann Arbor, MI USA

Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection

Chan, Heang-Ping; May 2006; 62 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0214

Report No.(s): AD-A459130; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459130>; Avail.: CASI: A04, Hardcopy

The goal of the project is to develop computer-aided diagnosis (CAD) methods and systems for mammography using advanced computer vision techniques and image information fusion from multiple mammograms to improve lesion detection and characterization. When fully developed the CAD system can assist radiologists in mammographic interpretation. During this project year we have performed the following tasks: (1) collected databases of digital mammograms (DMs) and digitized film mammograms (DFMs) for development of the CAD systems (2) compared the performance of the microcalcification detection system on DMs and DFMs (3) developed two-view information fusion techniques for the mass detection system (4) developed bilateral analysis technique for the mass detection system and (5) evaluated the effects of reconstruction image quality on mass detection for digital tomosynthesis mammography (DTM) which is a promising new imaging modality for improving breast cancer detection. In summary we have investigated a number of areas in CAD of mammographic lesions and evaluated new techniques for both DMs and DFMs. We have found that our new computer-vision techniques and multiple-image analysis approach can improve the performance of the CAD systems. We have also explored CAD methods for DTM and evaluated their dependence on reconstruction techniques. We will continue the development of the CAD systems for mammography in the coming years.

DTIC

Breast; Cancer; Computer Techniques; Diagnosis; Mammary Glands

20070003204 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA

An Evaluation of Stereoscopic Digital Mammography for Earlier Detection of Breast Cancer and Reduced Rate of Recall

Getty, David J; Aug 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0295

Report No.(s): AD-A459131; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459131>; Avail.: CASI: A03, Hardcopy

The goal of this project is to evaluate in a screening context stereoscopic digital mammography versus standard

(non-stereo) digital mammography for earlier detection of breast lesions during screening and for reductions in the rate of patient recall for further work-up. At the end of the fourth year of the project we have enrolled 585 patients into the clinical trial. Following independent reading of the standard and stereo screening mammograms 115 patients (19.7%) were recalled for work-up studies of 141 reported findings (60 from standard mammography alone 45 from stereo mammography alone and 36 reported by both). Work-up examinations confirmed 62 of the reported findings as true positives (including 15 cancers) and 79 as false positives. With regard to true positive findings (detection sensitivity) standard mammography detected 46 and missed 16; stereo mammography detected 49 and missed 13-an improvement in sensitivity of 6.5%. With regard to detection specificity standard mammography reported 50 false positive lesions while stereo mammography reported only 32-a highly significant reduction of 36% in the rate of false positive detections (p<0.005). Thus at this stage of the clinical trial stereo mammography is demonstrating a modest improvement in sensitivity and a remarkable improvement in specificity relative to standard mammography.

DTIC

Breast; Cancer; Mammary Glands

20070003205 Virginia Univ., Charlottesville, VA USA

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal

Chirgwin, John M; Aug 2006; 6 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0586

Report No.(s): AD-A459135; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459135>; Avail.: CASI: A02, Hardcopy

Cancer cachexia has three clinical features: 1) loss of appetite (anorexia), 2) nutritional mal-absorption, and 3) muscle and fat wasting caused by tumor-stimulated factors. This project focused on muscle wasting. A number of factors have been proposed to cause cancer cachexia. Lack of progress in the area is unfortunate, given the tremendous benefit patients with advanced cancer would receive from effective treatment of cachexia to improve quality of life and postpone mortality. We proposed that autocrine motility factor (AMF) is released into the bloodstream from cancer sites and stimulates muscle wasting. During the grant period we: 1) Established an animal model in which CHO/AMF tumors caused cachexia in mice; 2) Showed that injection of recombinant AMF protein caused significant weight loss in mice in 24 hours; 3) Solved the 3-D structures of mouse and human proteins; 4) Initiated characterization of the genes involved in muscle protein degradation in response to cachexia in the mouse model with CHO/AMF tumors.

DTIC

Animals; Cancer; Genes; Locomotion; Muscles; Proteins; Tumors

20070003207 Colorado Univ., Aurora, CO USA

Patient Race and Outcome Preferences as Predictors of Urologists Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer

Nov 2006; 73 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0897

Report No.(s): AD-A459143; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459143>; Avail.: Defense Technical Information Center (DTIC)

This is a nationally-representative mailed survey of 2000 urologists to (1) collect information about physician sociodemographics and clinical practice characteristics and (2) relate this information to treatment recommendations in three clinical vignettes. The vignettes allow for assessments of the independent effects of patient race, age, socioeconomic status, and tumor characteristics on urologist treatment recommendations in the setting of moderate grade, localized prostate carcinoma. To date, we have completed the survey and written three manuscripts. Two of these have been accepted for publication and a third is under review. A fourth is in preparation. The survey response rate was 66.1%, which is excellent. Key findings include the following. First, patient social vulnerability interacts with race to influence urologist treatment recommendations for radical prostatectomy. This is a novel finding with important implications for health disparities research more broadly. Second, the vast majority of urologists report performing fewer than 2.5 radical prostatectomies per month. Based on volume-outcome literature for radical prostatectomy, this raises significant concerns about surgical skill and outcomes. Third, a majority of urologists rate their own surgical outcomes as better than the national average, and a significant proportion provide erroneous information about comparative outcomes for major treatment modalities. Finally, for a hypothetical 77 year old patient who desires cure, 85% of urologists recommended aggressive therapy when the patient has few concerns about treatment side effects and 68% of urologists recommended aggressive therapy when the patient does have concerns about side effects. These results are concerning because aggressive therapy confers little survival benefit but a high

likelihood of side effects that should be avoided even in patients who profess little concern about side effects.
DTIC

Cancer; Patients; Predictions; Prostate Gland

20070003208 Health Research, Inc., Buffalo, NY USA

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer

Gao, Allen C; Jul 2006; 51 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-01-1-0089

Report No.(s): AD-A459144; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459144>; Avail.: CASI: A04, Hardcopy

Most prostate cancer patients respond initially to androgen ablation and antiandrogen therapy. However virtually all patients will relapse due to acquisition of the growth of the androgen-independent tumor cells. The molecular mechanism characterizing prostate cancer progression from androgen-dependence to androgenindependence is incompletely understood. We propose that Signal Transducers and Activators of Transcription 3 (Stat3) both regulates the expression of Stat3 target genes and interacts with AR in prostate cancer cells. The experiments proposed in this application are based upon the hypothesis that Stat3 activation alters androgen receptor signaling pathways which in turn results in the loss of growth control in prostate cancer cells. We propose to determine the consequence of Stat3 activation in prostate cancer cell growth and to determine the molecular basis of Stat3 interactions with androgen receptor signaling.

DTIC

Activation; Cancer; Hormones; Males; Prostate Gland; Transducers

20070003209 Beth Israel Deaconess Medical Center, Boston, MA USA

The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells

Feldman, Laurie; Nov 2006; 13 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0522

Report No.(s): AD-A459145; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459145>; Avail.: CASI: A03, Hardcopy

Data from our lab and others indicate that normal breast cells do not express the erythropoietin receptor (EpoR); conversely, breast cancer cells express functional EpoR. Expression of EpoR appears greatest in poorly oxygenated tumor regions and in patients with negative estrogen receptor status, a sign of more aggressive disease. In addition one study demonstrated that the EpoR gene is overexpressed in patients with micrometastatic disease. The differential expression of EpoR between normal and cancerous breast cells has led us to hypothesize that acquisition of EpoR expression by mammary epithelial cells may be part of malignant transformation and may impact disease progression and metastasis. Our proposal investigates changes in mammary epithelial cell biology associated with acquisition of EpoR expression. Our results will lead to a better understanding of the appropriate use of Epo in breast cancer patients and may lead to development of the EpoR as a novel therapeutic target in the treatment of breast cancer.

DTIC

Breast; Cancer; In Vitro Methods and Tests; Mammary Glands

20070003210 Texas A&M Univ., College Station, TX USA

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells

May 2006; 35 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0341

Report No.(s): AD-A459146; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459146>; Avail.: CASI: A03, Hardcopy

The CAD gene is trifunctional and expresses carbamoylphosphate synthetase/aspartate carbamyltransferase/dihydroorotase which are required for pyrimidine biosynthesis. TODD inhibited hormone-induced activation of CAD mRNA levels and pOAD promoter-reporter gene activity in MOF-7 and ZR-75 cells. Using fluorescence resonance energy transfer (FRET) it was shown that both E2 and TODD enhanced AhR-ER interactions. E2 also induced interactions between ER and Sp1 however cotreatment with TODD abrogated this effect. Results of this study demonstrate a unique model of AhR-ER crosstalk where the liganded AhR inhibits ER-Sp1 interactions and also recruits ER to Ah-responsive gene promoters such as CYP1A1. In addition CAD gene was also used as a model to study the mechanism underlying the crosstalk between ER and PPAR signaling pathways. PPAR ligand PGJ2 inhibited E2-induced OAD gene expression and also down regulated

E2-mediated transactivation of CAD gene promoter constructs and this was reversed by PPAR antagonist TOO7 in MOF-7 cells. This suggests a possible inhibitory crosstalk between PPAR and ER signaling pathways in breast cancer cells. In addition, 1,1- Bis(3'indolyl)-1-(p-substitutedphenyl)methanes containing p-t-butyl (DIM-C-pPhtBu) and p-phenyl (DIM-C-pPhC6H5) groups a new class of PPAR agonists inhibited E2-mediated transactivation of CAD gene promoter constructs however this effect was PPAR-independent.

DTIC

Biosynthesis; Breast; Cancer; Computer Aided Design; Gene Expression Regulation; Genes; Hormones; Mammary Glands; Pyrimidines

20070003211 Northern California Inst. for Research and Education, San Francisco, CA USA

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis

Lau, Yun-Fai C; Apr 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0247

Report No.(s): AD-A459149; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459149>; Avail.: CASI: [A02](#),

Hardcopy

Oxidative stress may play a role in human oncogenesis, including breast cancer. The mitochondria are most common sources of reactive oxygen species (ROS) responsible for most oxidative stress. This project evaluates the role of mitochondrial abnormalities in oxidative stress in breast cancer development. Transgenic mice harboring mutant mitochondrial Complex II subunit targeted in the mammary glands will be characterized in terms of mitochondrial functions, ROS production and oncogenesis. The effects of oxidative stress in other transgenic mouse models of breast cancer or predisposed mice will be generated by cross-breeding and analyzed in terms of their courses of oncogenesis in the presence or absence of the mitochondrial mutant transgene, and hence oxidative stress. This study should provide significant information regarding the role of oxidative stress in breast cancer development and progression, and insights on whether antioxidants are beneficial in prevention and treatment of such important cancer in women.

DTIC

Breast; Cancer; Mammary Glands; Mitochondria; Oncogenes; Oxidation; Oxygen; Reactivity; Tumors

20070003212 Indiana Univ., Indianapolis, IN USA

Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect

Clare, Susan E; Aug 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0735

Report No.(s): AD-A459152; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459152>; Avail.: CASI: [A02](#),

Hardcopy

To test the hypothesis that there are growth factors/cytokines released to promote healing of the wound created by the resection of a primary breast cancer which have the unintended consequence of enabling the growth of micrometastatic foci present at the time of operation. This study was designed as a feasibility study to test whether it is technically possible to reliably assay changes in the low molecular weight serum proteome. Human xenograft breast tumors were established in 9 of 12 nude mice. Blood samples were obtained from the mice immediately prior to extirpation of the primary breast cancer and then again 24 hours, 48 hours and 7 day post-operatively. In the analysis of the serum of 5 of the mice there were 8685 peptides quantified resulting in 5949 proteins. Of these 5949 proteins 155 were identified with high confidence and 11 proteins had significant changes among the time points as a function of time pre or post-op. One of these proteins is a splice variant of the Leukemia Inhibitory Factor. We have cloned three forms of this receptor, the full length, secretory and membrane forms.

DTIC

Blood; Breast; Cancer; Mammary Glands; Serums; Therapy

20070003213 Scripps Institution of Oceanography, La Jolla, CA USA

Refining Functional Optical Imaging of the Breast with Quantum Dots

Aug 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0660

Report No.(s): AD-A459154; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459154>; Avail.: CASI: [A03](#),

Hardcopy

The Quantum Dot Corporation has recently completed the development of a QD which emits in the near infrared (NIR): QD 705 Streptavidin Conjugate, which can be excited at 633 nm. One step towards using QDs as a functional imaging agent

were realized by linking them to immunoglobulin G and Streptavidin where it was demonstrated that the QDs could be used to label the breast cancer marker Her2 on the surface of live cancer cells. This report documents a set of lab experiments on gelatin phantoms that were designed to look at the potential for enhanced imaging of QDs. Our method of choice consisted of using ultrasound in order to label them. A bench top system for testing the use of ultrasound to modulate potential specimens was assembled. Recorded data from specimen preparations in the presence and absence of QDs were recorded. Results indicate that the modulated light from QDs can be observed, however is substantially weaker than that observed from the elastically scattered light (at 532 nm). The potential use of Acoustic Modulation for increased resolution of QDs is therefore possible.

DTIC

Breast; Cancer; Imaging Techniques; Mammary Glands; Near Infrared Radiation; Quantum Dots; Refining

20070003217 New South Wales Univ., Sydney, Australia

Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer

Russell, Pamela J; Khatri, Aparajita; Husaini, Yasmin; Chapman, Jane; Jan 2006; 99 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0107

Report No.(s): AD-A459159; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459159>; Avail.: CASI: A05, Hardcopy

Prostate cancer is the second highest cause of cancer death in men in Western society. Early disease is treatable by surgery or radiation, but once late stage disease becomes refractory to hormone removal, patient care is limited to pain management. New treatments are needed. We use gene therapy, alone and in combination with hormones called cytokines that stimulate the immune system. The concept is that delivering a cell-killing agent to an accessible tumor, coupled with help from the immune system can promote tumor reduction both at the treatment site and at remote locations. In this therapy, a gene (a fusion of cytosine deaminase and uracil phosphoribosyltransferase (CD/UPRT)) is delivered to a cancer cell by a virus, or expressed by molecular engineering, so that harmless bacterial proteins are made. When followed by a pro-drug, 5 fluorocytosine (5FC), cancer cells that make CD/UPRT convert SF0 to a toxin that kills the original and neighbouring cells. This system works in slow growing tumors like prostate cancer. Killing the tumor cells attracts immune cells. We are identifying these and then delivering cytokine genes that attract more immune cells into the tumors. We will deliver the cytokine gene alone or with the suicide gene because in other studies, combination therapy works better.

DTIC

Cancer; Enzymes; Gene Therapy; Genes; Mice; Prostate Gland; Tumors

20070003218 Baylor Coll. of Medicine, Houston, TX USA

A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate

Zhang, Xiaoliu; Jul 2006; 8 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0437

Report No.(s): AD-A459160; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459160>; Avail.: CASI: A02, Harcopy

ONE of THE MAJOR LIMITATIONS FACING the THERAPEUTIC USE of ONCOLYTIC VIRUSES INCLUDING ONCOLYTIC HSV IS THAT the PRE-EXISTING ANTI-VECTOR IMMUNITY CAN SUBSTANTIALLY REDUCE the INFECTIVITY of THE VIRUS. WE PROPOSED IN the AIM 3 of THIS FUNDED PROJECT to ADDRESS THIS ISSUE WITH TWO STRATEGIES: 1) to DELIVER ONCOLYTIC HSVs THROUGH LIPOSOME-FORMULATED VIRAL DNA INSTEAD of THE TRADITIONAL VIRAL PARTICLES AND 2) to USE T-LYMPHOCYTES AS A CARRIER FOR ONCOLYTIC HSV DELIVERY. IN TESTING the FIRST STRATEGY OUR DATA DEMONSTRATED THAT VIRAL DNA FORMULATED WITH LIPOSOMES GAVE the HIGHEST NUMBER of PLAGUES. VIRAL CAPSIDS FORMULATED WITH LIPOSOME GAVE the SECOND BEST RESULT. IN TESTING the SECOND STRATEGY OUR RESULTS SHOWED THAT ONCOLYTIC HSV COULD BE EFFICIENTLY LOADED ONTO the CARRIER CELLS USING A HITCHHIKE METHOD and WAS THEN SUCCESSFULLY HANDED OFF to THE TARGET CELLS. WE CONCLUDE THAT THIS HITCHHIKE STRATEGY REPRESENTS A VERY EFFICIENT WAY of LOADING ONCOLYTIC VIRUS to THE CARRIER CELLS WHICH ARE OTHERWISE NONPERMISSIVENESS to INFECTION of ONCOLYTIC HSVs.

DTIC

Cancer; Infectious Diseases; Prostate Gland; Therapy; Viruses

20070003220 California Univ., Los Angeles, CA USA

Quality of Breast Cancer Care: The Role of Hispanic Ethnicity, Language, and Socioeconomic Position

Tisnado, Diana M; Jun 2006; 20 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0328

Report No.(s): AD-A459165; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459165>; Avail.: CASI: A03,

Hardcopy

The goal of this work is to inform our understanding of racial and ethnic disparities in breast cancer care and the impact of socioeconomic position and linguistic barriers. We have enriched existing data from a population-based sample of Los Angeles women diagnosed with breast cancer in 2000 with publicly available 2000 Census data. We identified census tracts classified as Poverty Areas ($\geq 20\%$ of population below the federal poverty level (FPL)); Undereducated Areas ($\geq 25\%$ of the adult population lacks high school degree percentages of foreign-born citizens race/ethnic groups limited English-proficiency (LEP) and unemployment. Preliminary findings: breast cancer patient survey response and treatment in hospitals with characteristics associated with high quality care both vary by race/ethnicity and neighborhood characteristics. These results support the hypothesis that quality of care research should consider patient healthcare setting and neighborhood characteristics. Cancer care providers report notable proportions of LEP patients in their practice and varied methods for communicating with them. Providers and patients in large practices have more access to trained interpreters. Black and Spanish-speaking women were more likely than whites to report not receiving desired help for symptoms. More black and Hispanic (Vs white) women reported that they believed the doctor did not think treatment would benefit her the doctor did not appreciate how much the problem bothered her the doctor did not know about treatments or insurance/cost barriers. Physician reports indicate that better symptom

DTIC

Breast; Cancer; Mammary Glands

20070003222 Princeton Univ., NJ USA

EGFR Activation by Spatially Restricted Ligands

Clouse, Katherine N; Goodrich, Jennifer S; Jun 2006; 52 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0393

Report No.(s): AD-A459169; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459169>; Avail.: CASI: A04,

Hardcopy

Misregulation of Transforming Growth Factor alpha (TGFalpha) and increased Epidermal Growth Factor Receptor (Egfr) activity has been associated with an increased prognosis of breast cancer. During coexpression in *Drosophila melanogaster* local Egfr activation by the spatially-restricted TGFalpha-like ligand Gurken (Grk) is required for axis formation in the egg and future embryo. Squid (Sqd) a heterogeneous nuclear ribonucleoprotein (hnRNP) functions in the localization and translational regulation of grk mRNA. The purpose of this project is to identify factors that function with Sqd to produce spatially-restricted Egfr activation. We have integrated genetic and biochemical methods to identify and characterize the following factors that interact with Sqd: (1) an arginine methyltransferase CG6554 which may serve to methylate Sqd in vivo, (2) Hrb27C an hnRNP protein and Ovarian tumor which are required for proper grk expression and (3) Bruno Cup and polyA-binding protein which function together to mediate grk translational regulation.

DTIC

Breast; Cancer; Drosophila; Genetics; Ligands; Mammary Glands; Molecular Biology; Ovaries; Proteins; Ribonucleic Acids

20070003224 Brigham and Women's Hospital, Boston, MA USA

Caveolin-1 Modulates Androgen Receptor Signaling in Advanced Prostate Cancer

Lu, Michael L; Feb 1, 2006; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0017

Report No.(s): AD-A459172; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459172>; Avail.: CASI: A03,

Hardcopy

In the past funding year, we characterized a novel serine/threonine p21 activated protein kinase 6 (PAK6) as a key signal mediator in regulating non-genomic AR signal transduction within membrane-associated caveolin/raft domain. We found that in prostate cancer cells androgen stimulation activates PAK6. Consequently, PAK6 activation promotes prostate cancer cell motility. Ectopic expression of constitutive active PAK6 in prostate cancer LNCap cells promotes anchorage-independent soft agar colony growth. Our results support the hypothesis set forth from our original proposal that AR signaling from raft to regulate its non-genomic function

DTIC

Cancer; Prostate Gland

20070003225 Mississippi Univ., University, MS USA

Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer

Wadkins, Randy M; Jul 2006; 12 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0078

Report No.(s): AD-A459174; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459174>; Avail.: CASI: A03, Hardcopy

The purpose of this proposal was to investigate the response of prostate cancer to a series of camptothecin analogs, which are drugs that target DNA topoisomerase I. This final report summarizes the accomplishments toward the original goals of the project. We note that while some experimental problems were encountered that limited the completion of all tasks, good progress was made overall on the proposed research.

DTIC

Cancer; Deoxyribonucleic Acid; Enzymes; Prostate Gland

20070003227 Pennsylvania Univ., Philadelphia, PA USA

Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer

Rozenberg, Gabriel I; Jun 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0421

Report No.(s): AD-A459178; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459178>; Avail.: CASI: A03, Hardcopy

The objective of our work was to study the role of cell-ECM interactions in the increased survival, migratory and invasive phenotype found in the transition from DCIS to invasive carcinoma. We considered the possibility that loss of tissue architecture could elicit malignant transformation via integrin- growth factor receptor- regulated ERK effects on growth and survival as well as on angiogenesis, probably through a close interaction between tumor cells and macrophages. Ectopic expression of alpha5Beta1 integrin enhanced invasion, migration and survival of the premalignant S3-C cells in vitro, as well as increasing their malignant phenotype in vivo in nude mice. We proposed that alpha5Beta1 integrin could be affecting the cells phenotype via induction of the flt-1 VEGFR expression, which would participate in an autocrine survival loop. The enhanced malignant phenotype in vivo was characterized by an angiogenic switch, correlated with increased macrophage infiltration of the tumor. In vitro experiments suggest that this increase in angiogenesis potential might involve a paracrine loop between macrophages and MECs, in which macrophage- derived EGF induces an increase in IL-8 expression by MECs, which in turn increases their angiogenic ability.

DTIC

Angiogenesis; Breast; Cancer; Mammary Glands; Phenotype

20070003228 Pittsburgh Univ., Pittsburgh, PA USA

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk

Modugno, Francesmary; Sep 2006; 13 pp.; In English

Contract(s)/Grant(s): DAMD17-01-1-0091

Report No.(s): AD-A459179; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459179>; Avail.: CASI: A03, Hardcopy

The goal of this project is to determine whether bone mineral density (assumed to be an integrated marker of sex steroid hormone exposure) is a risk factor for prostate cancer; and (2) to identify prostate cancer susceptibility alleles among genes in the sex steroid pathway. To address these aims, we undertook a case-control study of African American and Caucasian men in Pittsburgh, PA and Birmingham, AL. As of 6/13/10, 234 Caucasian and 56 African American (AA) cases and 237 Caucasian and 67 AA controls with PSA ≥ 3.0 ng/mL frequency matched by age and race to Hip, spine and total body BMD is measured by Dual-energy X-ray Absorptiometry (DXA) on all participants. Blood specimens have been used to isolate DNA on all subjects. Polymerase Chain Reaction (PCR) techniques were used to determine allelic distributions of genotypes for sex steroid metabolism, biosynthesis and action genes. Risk factor data were obtained by an in-person interview and are immediately scanned into the study database. All data collection is complete and we are now analyzing the data. We will evaluate the role of BMD and candidate genotypes in prostate cancer risk by race. We will further examine the interaction between BMD and genotypes to evaluate the hormonal environment - gene interaction and its effect on prostate cancer risk.

DTIC

Bone Mineral Content; Cancer; Genes; Hormones; Minerals; Polymerization; Prostate Gland; Risk; Sex; Steroids

20070003229 California Univ., Berkeley, CA USA

Undergraduate Training in Mammary Gland Biology and Breast Cancer

Bissell, Mina J; May 2006; 45 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0178

Report No.(s): AD-A459182; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459182>; Avail.: CASI: [A03](#),
Hardcopy

This research report describes the third and final year of the BCRT undergraduate research training program in breast cancer. The goal of this project was to provide undergraduate trainees with exposure to areas of breast cancer research that focus on the role of microenvironment in mammary gland biology and in the development of neoplasia. Trainees in this project benefited from working in a program that investigates the intersection of hormones, growth factors, and extracellular matrix (ECM) signaling and remodeling during mammary gland morphogenesis, differentiation, and carcinogenesis. The program was advertised through several undergraduate research forums on the UC Berkeley campus, and more than forty applications were received. From these, eight applicants were selected to represent a balance of interests and approaches, with broad levels of expertise ranging from laboratory novices to students with many years of laboratory experience. During the research portion of the program, undergraduate trainees had frequent interaction with mentors and with advanced postdoctoral fellows, and reports were presented in organized, biweekly meetings structured to reflect the organization of a research paper. At the first meeting, the students presented the introduction to their research project; at the second, the materials and methods; at the third, the results. For the final meeting of the program, the students presented their work in complete form, including conclusions and interpretations. While the success at obtaining experimental results within the allotted time of the research program varies, all the participants (both students and preceptors) agreed that the overall experience was successful.

DTIC

Breast; Cancer; Education; Mammary Glands

20070003231 Nebraska Univ., Lincoln, NE USA

Process Research and Development of Antibodies as Countermeasures for C. Botulinum

Meagher, Michael; Mar 2006; 37 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0659

Report No.(s): AD-A459188; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459188>; Avail.: Defense Technical Information Center (DTIC)

This report describes the design of a CGMP facility for yeast and bacteria on the first floor and basement of Othmer Hall, the home for the University of Nebraska-Lincoln Biological Process Development Facility. Design and a preliminary cost estimate is completed and the Program statement for the project is being submitted to the University of Nebraska Board of Reagents for approval. This report also describes research on the expression of antibodies in Chinese Hamster Ovary (OH 0) cells against serotype A botulinum neurotoxin. We have completed construction of a simplified and easy to use CHO expression plasmid for the light and heavy chain, a system for selection of higher expression clones using dfr and zeocin for selection and GFP (green fluorescence protein) and flow cytometry for selection of higher expressing clones, and finally a development of a defined media for fed-batch production of mAb in CHO.

DTIC

Antibodies; Clostridium Botulinum; Countermeasures

20070003232 State Univ. of New York, Stony Brook, NY USA

Molecular Basis of Essential Thrombocytosis

Bahou, Wadie; Jun 2006; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0349

Report No.(s): AD-A459189; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459189>; Avail.: CASI: [A03](#),
Hardcopy

Human blood platelets play critical roles in normal hemostatic processes and pathologic conditions such as thrombosis (i.e. cardiovascular disease and stroke), vascular remodeling, inflammation, and wound repair. Despite the biological importance of platelets and their intact protein synthetic capabilities, remarkably little is known about platelet mRNAs. The pathogenesis of essential thrombocytosis (ET), a disease of platelet number and function, is poorly understood at the molecular level. The main goal of this project is to build on our preliminary data that suggests that patients with ET have distinct platelet transcript profiles that differ from those of normal platelets. The three main hypotheses to be tested are: (1) patients with ET have mRNA profiles that are distinct from those of normal controls; (2) these differences can be used to elucidate the molecular basis of ET; and (3) these differences can be used to differentiate ET from other causes of thrombocytosis (ET diagnostics).

Completion of the specific aims as outlined below should (i) provide considerable insight into the molecular basis of ET, (ii) assist with molecular diagnostics, and (iii) help to devise rational approaches for pharmacological intervention.

DTIC

Cardiovascular System; Heart Diseases; Pathogenesis; Platelets

20070003234 Pennsylvania Univ., Philadelphia, PA USA

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy

Zhu, Timothy C; Sep 1, 2006; 119 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0132

Report No.(s): AD-A459194; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459194>; Avail.: CASI: [A06](#),
Hardcopy

We have completed all specific aims of the project. We have developed motorized probe and associate software to characterization of optical properties in vivo in human prostate (specific aim 1). We have shown that the effective attenuation coefficient μ_{eff} varied between 0.91 6.7 cm⁻¹ (mean 2.9 +/- 0.8 cm⁻¹), corresponding to an optical penetration depth ($\delta = 1/\mu_{eff}$) of 0.2 1.1 cm (mean 0.4 +/- 0.1 cm). We have made comparison of light fluence rate between calculation and measurement (specific aim 2) in 14 patients and have shown an agreement of 30%. We have developed the motorized probe and associate software to measure the distribution of optical properties, drug concentration, and StO₂ interstitially using both absorption and fluorescence techniques (specific aim 3) and have verified the agreement between the two methods for determination of photosensitizer. We developed software to automatically optimize the light source weights, lengths, strengths in near real-time to improve the light fluence rate distribution in prostate and spare dose to critical structures (specific aim 4). In addition, we have developed a 12-channel beamsplitter for light delivery with motorized attenuators.

DTIC

Attenuators; Cancer; Dosimeters; Drugs; Optical Properties; Prostate Gland; Real Time Operation; Therapy

20070003235 Duke Univ., Durham, NC USA

A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast

Bennett, Craig B; May 2006; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0232

Report No.(s): AD-A459201; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459201>; Avail.: CASI: [A03](#),
Hardcopy

We selected *Saccharomyces cerevisiae* mutants that suppressed the G1 arrest and lethality observed following expression of BRCA1 in yeast. This genetic screen identified conserved interactive components of the CCR4 damage response network that participate in mRNA elongation, transport and decay. These genes confer resistance to IR and UV as well as transcription elongation inhibitors. Since transcription elongation is regulated by phosphorylation of the RNA polymeraseII (RNAPII) carboxy terminal domain (CTD), we examined the status of RNAPII CTD phosphorylation following BRCA1 induction. BRCA1-induced cleavage of the phospho-CTD was observed in WT, but not in mutant suppressor strains. Both lethality and CTD cleavage was suppressed by cancer-related mutations in the BRCT domain of BRCA1 in WT yeast. Using co-immunoprecipitation, we determined that Spt4p and Dhh1p physically interact with BRCA1 in yeast, while the conserved human orthologs of Dhh1p (Ddx6p) and Spt5p interact with BRCA1 in human MCF7 cells following DNA damage. Immunofluorescent colocalization of BRCA1, Spt5p and Ddx6p at cytoplasmic P-bodies in MCF7 cells suggests that BRCA1 shuttling plays a key role in mRNA decay. We hypothesize that defects in BRCA1-mediated RNAPII CTD cleavage and cytoplasmic mRNA shuttling following DNA damage are critical early events in the onset of breast cancer.

DTIC

Breast; Cancer; Mammary Glands; Mutations; Targets; Yeast

20070003239 Columbia Univ., New York, NY USA

Novel Therapeutic Approach for Breast Cancer

Sarkar, Devanand; Jun 2006; 62 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0290

Report No.(s): AD-A459211; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459211>; Avail.: CASI: [A04](#),
Hardcopy

Limitations of current viral-based cancer gene therapies include lack of cancer-specific targeting and insufficient tumor delivery. To ameliorate these problems I constructed a conditionally replication competent adenovirus (CRCA) manifesting

the unique properties of tumor-specific virus replication and production of a cancer-selective cytotoxic cytokine, melanoma differentiation associated gene-7/interleukin-24 (mda-7/IL-24), which embodies potent bystander antitumor activity. Cancer cell selective tropism was ensured by engineering the expression of the adenoviral E1A protein, necessary for viral replication, under the control of the promoter of progression elevated gene-3 (PEG-3) which functions selectively in diverse cancer cells with minimal activity in normal cells. In the E3 region of this CRCA we introduced the mda-7/IL-24 gene, thereby mediating robust production of this cytokine as a function of adenovirus replication. Infection of this CRCA (designated Ad.PEG-E1A-mda-7) in normal mammary epithelial cells and breast cancer cells confirmed cancer cell selective adenoviral replication, mda-7/IL-24 expression, growth inhibition and apoptosis induction. Injecting Ad.PEG-E1A-mda-7 into human breast cancer xenografts in athymic nude mice completely eradicated not only the primary tumor but also distant tumors (established on the opposite flank of the animal) thereby implementing a cure. This dual cancer-specific targeting strategy provides an effective approach for treating primary and metastatic breast cancers.

DTIC

Adenoviruses; Breast; Cancer; Mammary Glands; Proteins; Therapy

20070003241 Dana Farber Cancer Inst., Boston, MA USA

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer

Kufe, Donald W; Jul 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0487

Report No.(s): AD-A459218; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459218>; Avail.: CASI: A03, Hardcopy

The overall objective of this project is to study the safety, immunologic response and clinical effects of vaccinating breast cancer patients with dendritic cell (DC)/tumor fusions in conjunction with IL-12. Studies performed in Task 1 have shown that the DC/breast tumor fusions are effective in (1) stimulating cytokine production, and (2) inducing tumor-specific T cell responses. Work performed over the past year has extended these studies by further defining the effects of stimulation with IL-12, Toll-like receptor agonists, CpG oligodeoxynucleotide and CD3/CD28 ligation as approaches that could be used to enhance effectiveness of the DC/breast tumor fusion vaccine. The results support our original hypothesis that IL-12 should be used in conjunction with the DC/breast tumor fusion vaccine in clinical trials. Our clinical protocol has been approved by the FDA, the NCI Clinical Trials Evaluation Program and the Dana-Farber/Harvard Cancer Center IRB. Lengthy delays in the DOD human use approval process have necessitated NCI recertification of the IL-12 before we can begin the trial.

DTIC

Breast; Cancer; Immunity; Lymphocytes; Mammary Glands; Metastasis; Vaccines

20070003243 Emory Univ., Atlanta, GA USA

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells

Sharma, Dipali; Aug 2006; 37 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0767

Report No.(s): AD-A459221; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459221>; Avail.: CASI: A03, Hardcopy

Breast tumors expressing estrogen receptor alpha (ER) respond well to therapeutic strategies using SERMs (selective estrogen receptor modulators) such as tamoxifen. However, about thirty percent of invasive breast cancers are hormone independent because they lack ER expression due to hypermethylation of ER promoter. Treatment of ER negative breast cancer cells with demethylating agents (5-aza-2 deoxycytidine or 5-aza-dC) and histone deacetylase inhibitors (trichostatin A or TSA) leads to expression of ER mRNA and functional protein. Here, we examined whether epigenetically reactivated ER is a target for tamoxifen therapy. Following treatment with TSA and 5-aza-dC, the formerly unresponsive ER negative MDA-MB-231 breast cancer cells became responsive to tamoxifen. Tamoxifen mediated inhibition of cell growth in these cells is mediated at least in part by the tamoxifen bound ER. Tamoxifen-bound reactivated ER induces transcriptional repression at estrogen responsive genes by ordered recruitment of multiple distinct chromatin-modifying complexes. Using chromatin immunoprecipitation, we show recruitment of two different corepressor complexes to ER responsive promoters in a mutually exclusive and sequential manner: the nuclear receptor corepressor (NCoR) - histone deacetylase 3 (HDAC3) complex followed by NuRD (nucleosome remodeling and histone deacetylation) complex. The mechanistic insight provided by this study might help in designing therapeutic strategies directed towards epigenetic mechanisms in the prevention or treatment of breast cancer.

DTIC

Breast; Cancer; Chromatin; Estrogens; Mammary Glands; Proteins

20070003244 Wayne State Univ., Detroit, MI USA

Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer

Yang, Zeng-Quan; Jun 2006; 7 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0459

Report No.(s): AD-A459222; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459222>; Avail.: CASI: [A02](#),
Hardcopy

The development of breast cancer is associated with gene amplification and overexpression that are believed to have a causative role in oncogenesis. An important challenge in breast cancer research is to identify and characterize these genetic changes. Focal amplifications involving chromosome 8p11-p12 occur in approximately 15-20% of primary, uncultured human breast cancers. Recently, we have undertaken a detailed genomic and expression analysis of the 8p11-p12 amplicon in breast cancer cell lines and identified several novel candidate genes including TC-1 and FLJ14299. We observed that TC-1 is located at the common core-amplified domain of the 8p11-12 region and overexpressed in the subset of breast cancer cells. Furthermore, we have found that TC-1 has properties of an oncogene: TC-1 expression in normal mammary epithelial cell line MCF10A increases growth rate and allows growth in soft agar. Notably, suppression of TC-1 expression by siRNA inhibited cell proliferation in TC-1 over expressing breast cancer cell lines. Our recent data also suggested that TC-1 over-expression.

DTIC

Breast; Cancer; Genes; Mammary Glands

20070003256 Johns Hopkins Univ., Baltimore, MD USA

Prostate Cancer Detection by Molecular Urinalysis

Pavlovich, Christian P; Chan, David Y; Apr 2006; 8 pp.; In English

Contract(s)/Grant(s): W81XWH-05-1-0167

Report No.(s): AD-A459246; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459246>; Avail.: CASI: [A02](#),
Hardcopy

Prostate cancer is the most commonly diagnosed cancer and the second leading cause of cancer-related death in the USA. The most common DNA alteration associated with prostate cancer is hypermethylation in the regulatory region of certain genes, particularly in the promoter of the pi-class glutathione-S-transferase (GSTP1) gene. Analysis of hypermethylation of other gene promoters in combination has demonstrated high sensitivity and specificity for prostate cancer diagnosis. In this project, we evaluate the feasibility of detection of prostate cancer by molecular urinalysis. Prostatic manipulation from sources such as a biopsy needle, transrectal ultrasound (TRUS) probe, or digital rectal exam (DRE), may cause prostatic DNA to appear in the urine by shedding of neoplastic cells or debris into the prostatic ducts and urethra. The specific impact of prostatic manipulation on the detection of DNA promoter hypermethylation in the urine is unclear, as there are no studies comparing urine obtained before and after prostatic manipulation in identical patients. We hypothesized that voided urine specimens from patients with prostate cancer would be more likely to have detectable DNA promoter hypermethylation immediately after prostate manipulation by TRUS-guided needle biopsy than after DRE. We have compared voided urine samples obtained after extended (15-second) DRE with voided urine samples obtained after TRUS-guided needle prostate biopsy from patients with suspected or confirmed prostate cancer using conventional methylation-specific PCR (MSP) analysis to examine the hypermethylation status of three different gene promoters: GSTP1, APC and EDNRB. These loci were chosen because of their high frequency of methylation in prostate cancer specimens. Methylation analysis at multiple genes has also been shown to have diagnostic and prognostic value in prostate cancer.

DTIC

Cancer; Detection; Prostate Gland; Urinalysis

20070003261 Texas Univ., Arlington, TX USA

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers

Kim, Jae G; May 1, 2006; 453 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0353

Report No.(s): AD-A459251; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459251>; Avail.: CASI: [A20](#),
Hardcopy

For the third year of the project, we have investigated the radiotherapy effects on rat breast tumor hemodynamics and also analyzed our previous data obtained from chemotherapy study with our mathematical model, which showed very good correlations between the hemodynamic parameters and tumor responses to the therapy. For experiments, we have applied single dose of radiation (30 Gy) to two groups of rats bearing syngeneic 13762NF mammary adenocarcinomas: one group received a radiation therapy during air inhalation and the other group was treated by irradiation during oxygen inhalation.

Acute effects were not observed during irradiation, but significant changes in vascular hemodynamic response to oxygen inhalation were observed from both groups at day 1 after irradiation. The preliminary results suggest that tumor oxygenation during radiation therapy may play a great role in treating the tumor. We have further analyzed our previous data from tumors treated by chemotherapy using our bi-exponential model. In cyclophosphamide study, maximum changes of oxyhemoglobin and amplitude of fast component from the fitting after cyclophosphamide treatment showed a good correlation with the tumor volume regression. From combretastatin A4 phosphate (CA4P) study, the changes of fitted parameters before, during, and post administration of CA4P treatment showed very similar results from previous studies. All the results again strongly support that near infrared spectroscopy with our model can be used to monitor the therapeutic responses of tumors after treatments. This will also be a great help for physicians to decide the direction of each patient's treatment, which will enhance the survival rate and reduce side effects.

DTIC

Biodegradability; Breast; Cancer; Chemotherapy; Drugs; Mammary Glands; Radiation Therapy; Tumors

20070003263 South Carolina Univ., Columbia, SC USA

Quasi-Pro prospective Study of Breast Cancer and Diet

Hebert, James R; Adams, Swann A; Aug 2006; 17 pp.; In English

Contract(s)/Grant(s): DAMD17-00-1-0327

Report No.(s): AD-A459253; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459253>; Avail.: CASI: A03, Hardcopy

Conventional breast cancer (BrCA) risk factors explain 50% of variability in disease rates and change in incidence over time. The past two generations of American women have experienced major changes in physical activity, the preparation and eating of food, and the prevalence of obesity. These factors may exert powerful influences on physiologic processes leading to cancer. This case-control study aims to investigate the relationship between physical activity, diet, adult weight history, and breast cancer. The goal is to recruit 648 incident cases of breast cancer and up to 2 controls per case from the Breast Care Centers of the Palmetto Richland and Baptist Hospitals of Palmetto Health/South Carolina Cancer Center (BCC) -- services that provide mammography screening for about 35,000 women each year, during which time about 700 women are diagnosed with breast cancer. After obtaining permission from the Human Use Review Office of the USAMRAA (on 30 November 2000) to begin recruitment, the authors finished the run-in process and began recruiting in the Palmetto Baptist Hospital BCC in the spring of 2001. Recruitment at Palmetto Richland began in May 2002. As of July 31, 2005, they had recruited 1,442 participants. Of these participants, 742 have completed all study requirements.

DTIC

Body Weight; Breast; Cancer; Diets; Mammary Glands; Risk

20070003272 Texas Univ., Brownsville, TX USA

Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy

Hanke, Andreas; Dec 5, 2006; 8 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0394

Report No.(s): AD-A459264; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459264>; Avail.: CASI: A02, Hardcopy

Recent advances in single-molecule force spectroscopy of DNA make it possible to study the thermodynamics and kinetics of DNA binding proteins under a wide range of conditions. A biophysical model for the DNA binding T4 gene 32 protein has been developed to study the kinetics of DNA protein binding to transient single-stranded DNA regions due to thermal fluctuations. The model is used to analyze recent single-molecule spectroscopy data of this system.

DTIC

Deoxyribonucleic Acid; Metabolism; Proteins; Spectroscopy

20070003273 Henry Ford Health System, Detroit, MI USA

Population Based Assessment of MHC Class 1 Antigen Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions

Worsham, Maria J; Jan 2006; 42 pp.; In English

Contract(s)/Grant(s): DAMD17-00-1-0288

Report No.(s): AD-A459265; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459265>; Avail.: Defense Technical Information Center (DTIC)

Despite advances in chemotherapy and radiation therapies, advanced breast cancer still carries a high mortality rate. The need for effective therapies is urgent. The overall aim of this research proposal is to recognize early markers of disease and their interaction with other epidemiological risk factors that can serve as risk indicators for subsequent development of breast cancer from precancerous lesions and as prognostic markers for progression from primary to metastatic disease. The major histocompatibility complex (MHC) class I molecules are found on the cell membrane of all cells in the body and are involved in intercellular communications and in complex interactions with the immune system. Cancer cells with reduced or aberrant MHC molecules have been shown to evade immune surveillance and become selected for cancer progression and spread of disease to distant sites of the body. About half of all breast cancers have complete loss or reduced level of MHC class I molecules and this finding has been associated with increased tumor invasiveness and more aggressive cancers with poorer outcome. The results of our investigation to assess the role of HLA class I in breast cancer progression are as follows: 1) formalin-fixed paraffin tissues represent a useful substrate upon which to monitor HLA antigen expression in malignant lesions, especially when appropriate markers are used to differentiate malignant cells from lymphocytes and dendritic cells; 2) there was a significant correlation of expression levels of HC10 and LGII and breast lesion type pointing in the direction of upregulation in tumor cells, rather than downregulation as commonly reported; 3) The results do not point to an association between HC10 abnormalities and stage; 4) There is a significant trend towards lesion severity and high lymphocytic infiltration.

DTIC

Antigens; Breast; Cancer; Lesions; Mammary Glands; Markers; Neoplasms; Populations; Risk

20070003276 Pennsylvania Univ., Philadelphia, PA USA

Genetic Counseling for Breast Cancer Susceptibility in African American Women

Hughes, Chanita; Sep 2006; 64 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-00-1-0262

Report No.(s): AD-A459270; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459270>; Avail.: CASI: A04,

Hardcopy

Increasingly, the cultural beliefs and values of women are being recognized as important factors in genetic counseling for breast cancer susceptibility. Despite recommendations to increase the cultural sensitivity of genetic counseling, such programs have not been developed or evaluated. The primary objectives of this study are to develop a Culturally Tailored Genetic Counseling (CTGC) protocol for African American women and to evaluate its impact on decision making and satisfaction about BRCA1 and BRCA2 testing, quality of life, and cancer control practices. A secondary objective of the study is to identify African American women who are most and least likely to benefit from CTGC vs. Standard Genetic Counseling (SGC). The key research accomplishments achieved during the past year include continuing an active program of subject recruitment, completing genetic counseling and education, and generating peer-reviewed manuscripts. The results generated during the past year demonstrate that while rates of test result acceptance may be low among African American women, the majority of women are extremely satisfied with genetic counseling. Satisfaction with culturally tailored genetic counseling may be especially high among some African American women at increased risk for hereditary disease.

DTIC

Africa; Breast; Cancer; Diseases; Females; Genetics; Mammary Glands; Sensitivity

20070003282 Army Research Inst. of Environmental Medicine, Natick, MA USA

Thermoregulatory Control Following Dynamic Exercise

Journey, W S; Carter, R; Kenny, G P; Nov 2006; 10 pp.; In English

Report No.(s): AD-A459276; M07-03; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459276>; Avail.: CASI:

A02, Hardcopy

Post-exercise thermoregulatory control in humans has received limited attention. In the post-exercise period skin blood flow and sweating return to pre-exercise levels despite a persistent elevation in esophageal temperature, suggesting an alteration in thermoregulatory control. The esophageal temperature response post-exercise appears to be correlated to the marked cardiovascular changes that occur after dynamic exercise. Recent work has shown that non-thermoregulatory factors associated with hemodynamic changes and hydration status post-exercise may influence the regulation of core temperature during exercise recovery. This review will characterize the thermal response and describe our current understanding of the physiological influences on thermoregulatory control during recovery from dynamic exercise.

DTIC

Body Temperature; Physical Exercise; Thermoregulation

20070003284 Columbia Univ., New York, NY USA

Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells

Masckauchan, T N; Jun 2006; 30 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0293

Report No.(s): AD-A459280; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459280>; Avail.: CASI: [A03](#),

Hardcopy

Wnts are lipid-modified secreted glycoproteins that regulate diverse biological processes. I have shown that Wnt5a, which functions in non-canonical Wnt signaling, promoted proliferation, cell survival and network formation on endothelial cells. In new experiments, Wnt5a induced non-canonical Wnt signaling in endothelial cells, as measured by Dishevelled and ERK1/2 phosphorylation, as well as inhibited canonical Wnt signaling. Using shRNA technology to target Wnt5a expression, both endothelial cell network formation and migration were inhibited. A DNA array screening for Wnt5a-regulated genes in cultured cells identified several encoding angiogenic regulators, and Tie-2, a receptor for angiopoietins, was validated as a new target gene of non-canonical Wnt signaling in human endothelial cells. So far, non-canonical Wnt signaling had unknown functions on endothelial cell biology. Experimental findings from this project highlight the importance of non-canonical Wnt signaling on angiogenesis.

DTIC

Breast; Cancer; Mammary Glands; Proteins

20070003285 Texas Univ., Dallas, TX USA

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome

Zhao, Dawen; Jun 2006; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0363

Report No.(s): AD-A459281; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459281>; Avail.: CASI: [A03](#),

Hardcopy

Vascular targeting agents (VTA) are new types of anticancer drugs that act on existing tumor vasculature, causing vascular disruption, which ultimately leads to extensive ischemic tumor cell death. Research findings have shown that VTA kills cells predominantly in the more hypoxic area of the tumor, the tumor center, as a consequence of hemorrhagic necrosis after vascular collapse, whereas the better perfused peripheral rim is less affected. This limits the effectiveness of such agents, allowing rapid regrowth of tumor residues to occur. However, these findings also suggest the possibility and promise of a combination of VTA with treatments specifically targeting the viable tumor rim. Radiation can be expected to be most effective against the well-perfused and oxygenated cell populations at the peripheries of the tumors. One major goal of this project is to fully understand and precisely assess the dynamic changes in blood perfusion and oxygenation after VTA, so that one can predict the response and optimize the therapy. The authors propose to use in vivo magnetic resonance imaging (MRI) to measure and assess physiological changes (e.g., tumor blood perfusion and dynamic tissue oxygenation) in tumors before and after VTA treatment. The authors believe that noninvasive MRI approaches may provide a valuable prognostic tool for predicting the response of specific breast tumors to VTA. Based on the data of in vivo tumor perfusion and oxygenation dynamics in response to the vascular targeting agent, combretastatin A-4-phosphate (CA4P) evaluated by MRI, the authors successfully designed a scheme to combine the radiation treatment and CA4P to treat breast tumors. This is the major goal of the proposed project. Moreover, the pathophysiological information will be especially useful for designing a complicated scheme, which usually involves a combination of fractionated radiation and multiple doses of systemic chemotherapy at clinical settings.

DTIC

Blood Vessels; Breast; Cancer; Cardiovascular System; Chemotherapy; Drugs; Mammary Glands; Physiological Effects; Radiation Therapy; Target Acquisition; Therapy; Tumors

20070003286 Virginia Univ., Charlottesville, VA USA

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound

Walker, William F; Jun 2006; 134 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0590

Report No.(s): AD-A459282; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459282>; Avail.: CASI: [A07](#),

Hardcopy

Ultrasonic imaging plays an important role as an adjunct to mammography, with an emerging role in breast cancer screening. Ultrasound's real-time nature, lack of ionizing radiation, and relative comfort for the patient make it an attractive

imaging choice. Unfortunately, ultrasound image quality is often limited. We hypothesize that bright scatters seriously degrade ultrasound images by introducing image clutter. In the breast, bright off-axis echoes may originate from Cooper's ligaments, structured glandular tissue, calcification, fat-soft tissue interfaces, or other structure. While we initially proposed using a variant of the Frost Adaptive Beamformer to reduce clutter, we have since discovered that this technique is non-optimal for our application. Extensive literature reviews have led us to utilize a recently proposed method, Spatial Processing Optimized and Constrained (SPOC). In initial simulations this method not only dramatically reduces image clutter, but also yields super-resolution. We are actively refining this method while developing the experimental tools needed for in vivo testing.

DTIC

Beamforming; Breast; Clutter; Mammary Glands; Ultrasonics

20070003287 State Univ. of New York, Albany, NY USA

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study

Muti, Paola; Mar 2006; 33 pp.; In English

Contract(s)/Grant(s): W81XWH-04-1-0195

Report No.(s): AD-A459283; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459283>; Avail.: CASI: [A03](#),

Hardcopy

The prevalence of breast cancer is greatest in industrialized regions, and exposure to light at night has been proposed as a potential risk factor. Modulation of melatonin secretion by light has been implicated in the causal pathway linking exposure to light and breast cancer risk. Recent evidence indicates that melatonin is a natural oncostatic agent capable of functioning through a variety of anti-proliferative, anti-oxidative, and immunostimulatory mechanisms. The authors propose to conduct a study on the association of prediagnostic melatonin production and subsequent breast cancer risk in a prospective cohort study, the Italian ORDET study. Prediagnostic melatonin production will be measured as urine levels of 6-hydroxymelatonin sulphate (6-OHMS), its primary enzymatic metabolite, in 12-hour urine (overnight) collection. The study will be conducted as a nested case-control study. They expect 533 breast cancer cases among cohort members during the 17-year follow-up period. Four controls will be matched to each case on age, menopausal status, recruitment center, and time of recruitment for a total number of 2,132 control subjects. This study will be the first one analyzing the potential effect of melatonin on breast cancer risk. The authors believe it will provide important data on likely key risk factors in the development of this disease.

DTIC

Breast; Cancer; Excretion; Hormones; Light (Visible Radiation); Mammary Glands; Melatonin; Modulation; Night; Risk

20070003314 Louisville Univ., KY USA

Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats

Wang, Eugenia; Feb 2006; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0450

Report No.(s): AD-A459331; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459331>; Avail.: CASI: [A02](#),

Hardcopy

In the first phase of this proposal, we identified mouse strains differentially resistant and susceptible to infection with three biothreat pathogens, Cowpox, Influenza, and Anthrax. In the second phase, the scope of our project is to identify: 1. Host-Oriented Pathogen Response (HOPR) Signaling Pathways, as the underlying mechanism responsible for host-specific susceptibility; and 2. the specific protein constellations responsible for the resistant or susceptible phenotypes. Pinpointing the specific protein(s) responsible for the host responses will allow us to develop specific drugs to convert susceptible into resistant phenotypes. Our ultimate goal is to use the knowledge and enabling technology gained for advanced diagnosis and countermeasures to biothreats.

DTIC

Countermeasures; Diagnosis; Infectious Diseases; Microorganisms; Pathogens; Viruses; Warfare

20070003325 Illinois Univ., Urbana-Champaign, IL USA

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing

Liu, Juewen; Lu, Yi; Jun 1, 2005; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0227

Report No.(s): AD-A459362; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459362>; Avail.: CASI: [A02](#),

Hardcopy

Controlled assembly of nanomaterials has been the focus of much research. In contrast, controlled disassembly has not

received much attention, even though both processes have been shown to be important in biology. By using a Pb(2+)-dependent RNA-cleaving DNAzyme, we demonstrate here control of the disassembly of gold nanoparticle aggregates in response to Pb(2+). In the process, we show that nanoparticle alignment plays an important role in the disassembly process, with the tail-to-tail configuration being the most optimal, probably because of the large steric hindrance of other configurations. The rate of disassembly is significantly accelerated by using small pieces of DNA to invade the cleaved substrate of the DNAzyme. Investigation of such a controlled disassembly process allows the transformation of previously designed 'light-down' colorimetric Pb(2+) sensors into 'light-up' sensors.

DTIC

Aggregates; Assembling; Colorimetry; Detection; Nanoparticles; Nanostructures (Devices)

20070003335 Texas Univ. Health Science Center, Houston, TX USA

User Evaluation of Biospice

Av-Ron, Evyatar; Byrne, John H; Oct 2006; 89 pp.; In English; Original contains color illustrations

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

Report No.(s): AD-A459405; FA8750-04-1-0242; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459405>; Avail.: CASI: [A05](#), Hardcopy

The BioComp project was established to provide the system biology community with a tool, a computing environment called Bio- SPICE, to carry out data collection, model development and computer simulation. Usability studies of the Bio-SPICE Dashboard and seven simulators/editors: BioSketchPad/Charon, BioSpreadSheet/ESS, Jarnac/JDesigner, JigCell, Simpathica, BioNets and Pathway Builder were performed. The usability of each simulator was examined and the interoperability of the various tools using System Biology Markup Language (SBML) as a language of exchange between the different applications. Each tool provides a model builder component and a simulator component. The model builder components varied from providing a scripting-like language, a tabular editor to a graphical user interface. The simulator components use either deterministic solver algorithms (e.g., CVODE, Backward Euler) or a stochastic solver using the Gillespie algorithm. Seven simulators/editors were examined with four models that produce oscillatory behavior or time course of a long duration. A tutorial manual and a use case document were written.

DTIC

Computerized Simulation; Data Acquisition; Evaluation; System Effectiveness; User Requirements

20070003342 Virginia Univ., Charlottesville, VA USA

The Impact of Tyrosine Kinase Signaling on Breast Cancer Development

Marozkina, Nadzeya V; Aug 2006; 20 pp.; In English

Contract(s)/Grant(s): DAMD17-03-1-0253

Report No.(s): AD-A459413; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459413>; Avail.: CASI: [A03](#), Hardcopy

In human breast cancers, c-Src is overexpressed in approx. 70% of cancers, suggesting that it interacts functionally with the HER family of receptors. In many human cancers, including breast cancer, EGFR is activated in an autocrine or paracrine manner by TGF alpha. To test whether interactions between TGF alpha, EGFR and c-Src result in synergistic increases in breast tumor development, transgenic mice expressing each of these genes under the control of the MMTV promoter are being developed. The MMTV promoter responds transcriptionally to glucocorticoids and steroids and causes expression of the transgene in steroid hormone responsive organs. We have generated MMTV EGFR mice and demonstrated the presence of the transgene by PCR and Southern analyses. At the present time, although we have evidence for elevated expression of the EGFR in hormonally responsive tissues (especially in multiparous animals), only one of the EGFR transgenic mice that we have developed had a visible tumor; however, 4 of 12 females showed focal hyperplasia of the mammary gland, 9 of 12 females showed varying degrees of cystic endometrial hyperplasia and dysplasia in the uterus or uterine horn and 6 of 12 females exhibited follicular or luteal cysts in ovary or oviducts and also exhibited a mild to moderate hypertrophy or dysplasia. Male reproductive tissues examined did not show any signs of preneoplastic conversion. The ability of TGF alpha to enhance tumor formation in MMTV EGFR transgenic mice was tested by crossing MMTV TGF alpha transgenic mice. Bigenic mice carrying both of these transgenes have been generated and are being examined for rates of tumor formation. It is expected that breast tumors will form in these bigenic mice, providing evidence for the role of both EGFR and TGF alpha in breast tumorigenesis. MMTV c-Src transgenic mice are under preparation, and the strategy and progress in generating such a strain will be discussed.

DTIC

Breast; Cancer; Hormones; Mammary Glands; Mice; Neoplasms; Proteins; Tyrosine

20070003346 Army Research Inst. of Environmental Medicine, Natick, MA USA

Prevention of Cold Injuries During Exercise

Castellani, J W; Young, A J; Ducharme, M B; Giesbrecht, G G; Glickman, E; Sallis, R E; Jan 2006; 19 pp.; In English
Report No.(s): AD-A459418; MISC06-03; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459418>; Avail.: Defense
Technical Information Center (DTIC)

In is the position of the American College of Sports Medicine that exercise can be performed safely in most cold-weather environments without incurring cold-weather injuries. The key to prevention is use of a comprehensive risk management strategy that: a) identifies/assesses the cold hazard; b) identifies/assesses contributing factors for cold-weather injuries; c) develops controls to mitigate cold stress/strain; d) implements controls into formal plans; and e) utilizes administrative oversight to ensure controls are enforced or modified. The American College of Sports Medicine recommends that: 1) coaches/athletes/medical personnel know the signs/symptoms and risk factors for hypothermia, frostbite, and nonfreezing cold injuries, identify individuals susceptible to cold injuries, and have the latest up-to-date information about current and future weather conditions before conducting training sessions ore competitions; 2) cold-weather clothing be chosen based on each individual's requirements and that standardized clothing ensembles not be mandated for entire groups; 3) the wind-chill temperature index be used to estimate the relative risk of frostbite and that heightened surveillance of exercisers be used at wind-chill temperatures below -27 deg C (-18 deg F); and 4) individuals with asthma and cardiovascular disease can exercise in cold environments, but should be monitored closely.

DTIC

Cold Weather; Injuries; Physical Exercise; Prevention

20070003349 Army Research Inst. of Environmental Medicine, Natick, MA USA

Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress

Kenefick, Robert W; O'Moore, Kathleen M; Mahood, Nicholas V; Castellani, John W; Jan 2006; 8 pp.; In English
Report No.(s): AD-A459427; M06-21; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459427>; Avail.: CASI:
A02, Hardcopy

This study sought to determine the effect of rapid intravenous (IV) versus oral (ORAL) rehydration immediately after dehydration, on cardiovascular, thermoregulatory, and perceptual responses during subsequent exercise in the heat.

DTIC

Heat Tolerance; Physical Exercise; Physiological Responses

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*.

20070002966 NASA Ames Research Center, Moffett Field, CA, USA

Electron-Impact Ionization and Dissociative Ionization of Biomolecules

Huo, Winifred M.; Chaban, Galina M.; Dateo, Christopher E.; [2006]; 1 pp.; In English; 231st ACS National Meeting, 26-30 Mar. 2006, Atlanta, GA, USA; Copyright; Avail.: Other Sources; Abstract Only

It is well recognized that secondary electrons play an important role in radiation damage to humans. Particularly important is the damage of DNA by electrons, potentially leading to mutagenesis. Molecular-level study of electron interaction with DNA provides information on the damage pathways and dominant mechanisms. Our study of electron-impact ionization of DNA fragments uses the improved binary-encounter dipole model and covers DNA bases, sugar phosphate backbone, and nucleotides. An additivity principle is observed. For example, the sum of the ionization cross sections of the separate deoxyribose and phosphate fragments is in close agreement with the C3(sup prime)- and C5 (sup prime)-deoxyribose-phosphate cross sections, differing by less than 5%. Investigation of tandem double lesion initiated by electron-impact dissociative ionization of guanine, followed by proton reaction with the cytosine in the Watson-Crick pair, is currently being studied to see if tandem double lesion can be initiated by electron impact. Up to now only OH-induced tandem double lesion has been studied.

Author

Biochemistry; Deoxyribonucleic Acid; Electron Impact; Ionization; Particle Interactions; Radiation Damage; Ionizing Radiation; Electron Beams

20070003132 Army Research Inst. of Environmental Medicine, Natick, MA USA
Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment

Cadarette, Bruce S; Levine, Leslie; Robinson, Scott B; Dec 2006; 37 pp.; In English

Report No.(s): AD-A459009; USARIEM-T07-02; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459009>;

Avail.: CASI: **A03**, Hardcopy

This study supported the Joint Protective Aircrew Ensemble (JPACE) Program, a joint service program including U.S. Army, U.S. Navy, U.S. Marine Corps, U.S. Air Force, and U.S. Special Forces Command participation. JPACE addresses the below-the-neck chemical and biological (CB) protective garment needs for all fixed wing and rotary wing aviation personnel and combat vehicle crew (CVC) personnel. We evaluated heat strain in volunteers during exercise-heat stress experiments conducted while they wore the JPACE and the currently fielded USAF CWU-66/P coveralls (66/P) with accepted aviation life support equipment (ALSE) and armored vehicle Mission Oriented Protective Posture level 4 (MOPP 4) uniform configurations for a total of 10 garment tests. Data from these tests are used in the evaluation process of the JPACE program.

DTIC

Coveralls; Flight Crews; Flying Personnel; Heat Tolerance; Physiological Responses; Protectors

20070003164 Army Research Inst. of Environmental Medicine, Natick, MA USA
Field Studies of Exercise and Food Deprivation

Hoyt, Reed W; Friedl, Karl E; Aug 2006; 7 pp.; In English

Report No.(s): AD-A459062; M06-40; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459062>; Avail.: CASI:

A02, Hardcopy

The increase in obesity in developed societies drives interest in the interplay of energy intake, metabolic energy expenditure, and body energy stores. A better understanding of energy management in physically active and undernourished humans should help guide strategies to manage obesity safely and effectively. This review focuses on field studies of men and women engaged in prolonged strenuous activities, ranging from ranger training to extreme expeditions. Although scientifically unconventional and limited, field studies of exercise and food deprivation have yielded interesting findings: 4-5% body fat is the normal lower limit to fat reserves in physically active underfed young adult men, and in response to exercise and underfeeding, women used more fat mass and less fat-free mass to meet metabolic fuel requirements. Field studies have shown that fat energy reserves in young adult men can be estimated as percentage body fat minus 5%, and initial body fat mass has a significant positive influence on fat oxidation rates per kilogram of fat-free mass during rapid weight loss associated with underfeeding and exercise. Data logging pedometers, activity monitors, global positioning systems, and wireless body and personal-area networks promise to make it easier to study and care for free-living humans.

DTIC

Energy Storage; Food Intake; Military Personnel; Physical Exercise

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also *16 Space Transportation and Safety* and *52 Aerospace Medicine*.

20070002636 NASA Marshall Space Flight Center, Huntsville, AL, USA

Technology Transition a Model for Infusion and Commercialization

McMillan, Vernotto C.; [2006]; 11 pp.; In English; 57th International Astronautical Congress: Connecting Space People, 2-6 Oct. 2006, Valencia, Spain; Original contains black and white illustrations

Report No.(s): IAC-06-E5.1.04; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002636>; Avail.: CASI: **A03**,

Hardcopy

The National Aeronautics and Space Administration has as part of its charter the mission of transferring technologies developed for the space program into the private sector for the purpose of affording back to the American people the economical and improved quality of life benefits associated with the technologies developed. In recent years considerable effort has been made to use this program for not only transitioning technologies out of the NASA Mission Directorate Programs, but also to transfer technologies into the Mission Directorate Programs and leverage the impact of government and private sector innovation. The objective of this paper is to outline an approach and the creation of a model that brings together industry, government, and commercialization strategies. When these elements are integrated, the probability of successful

technology development, technology infusion into the Mission Programs, and commercialization into the private sector is increased. This model primarily addresses technology readiness levels between TRL 3 and TRL 6. This is typically a gap area known as the valley of death. This gap area is too low for commercial entities to invest heavily and not developed enough for major programs to actively pursue. This model has shown promise for increasing the probability of TRL advancement to an acceptable level for NASA programs and/or commercial entities to afford large investments toward either commercialization or infusion.

Author

Technology Assessment; Commercialization; Technology Utilization; Probability Theory; NASA Programs

20070002804 NASA Marshall Space Flight Center, Huntsville, AL, USA

In-Space Crew-Collaborative Task Scheduling

Jaap, John; Meyer, Patrick; Davis, Elizabeth; Richardson, Lea; [2006]; 10 pp.; In English; 5th International Workshop on Planning and Scheduling for Space (IWSS), 22-25 Oct. 2006, Baltimore, MD, USA; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002804>; Avail.: CASI: [A02](#), Hardcopy

As humans venture farther from Earth for longer durations, it will become essential for those on the journey to have significant control over the scheduling of their own activities as well as the activities of their companion systems and robots. However, the crew will not do all the scheduling; timelines will be the result of collaboration with ground personnel. Emerging technologies such as in-space message buses, delay-tolerant networks, and in-space internet will be the carriers on which the collaboration rides. Advances in scheduling technology, in the areas of task modeling, scheduling engines, and user interfaces will allow the crew to become virtual scheduling experts. New concepts of operations for producing the timeline will allow the crew and the ground support to collaborate while providing safeguards to ensure that the mission will be effectively accomplished without endangering the systems or personnel.

Author

Spacecrews; Scheduling; Flight Crews; Personnel; Tasks

20070003044 Naval Ocean Systems Center, San Diego, CA USA

Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems

Sundheim, Beth M; Jan 1989; 7 pp.; In English

Report No.(s): AD-A458875; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458875>; Avail.: CASI: [A02](#), Hardcopy

A plan is presented for evaluating natural language processing (NLP) systems that have focused on the issues of text understanding as exemplified in short texts from military messages. The plan includes definition of bodies of text to use as development and test data, namely the narrative lines from one type of naval message, and definition of a simulated database update task that requires NLP systems to fill a template with information found in the texts. Documentation related to the naval messages and examples of filled templates have been prepared to assist NLP system developers. It is anticipated that developers of a number of different NLP systems will participate in the evaluation and will meet afterwards to present and interpret the results and to critique the test design.

DTIC

Message Processing; Natural Language (Computers); Natural Language Processing; Textbooks

20070003050 Language Systems, Inc., Woodland Hills, CA USA

MUC-3 Test Results and Analysis

Montgomery, Christine A; Stalls, Bonnie G; Belvin, Robert S; Stumberger, Robert E; Jan 1991; 9 pp.; In English

Contract(s)/Grant(s): MDA903-89-C-0041

Report No.(s): AD-A458882; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458882>; Avail.: CASI: [A02](#), Hardcopy

Table 1 summarizes LSI 's scores for Phase II of MUC-3 . In evaluating these scores, which place LSI about two-thirds of the way down in a results-ranked list of MUC-3 participants, it should be noted that our MUC- 3 system reflects a major redevelopment of the key components of the DBG message understanding system, which is currently in process . Specifically, innovative development of a parser based on government-binding principles is under way, 2 with associated revisions of the lexicon, functional parse (recovery of the predicate/argument functions representing the underlying semantic structure of the sentence), and DBG template 3 generation and frame hierarchy components (the areas indicated by the heavy lines in the system flow chart shown in Figure 1) . This innovative development is described more fully in the system summary paper.

For the purposes of this site report, it is obvious that the ‘under construction’ status of the DBG system had considerable impact upon our ability to achieve a respectable score. Had we chosen instead to go with the fairly robust previous version of the DBG system (described in [2] and [3], recently evaluated for Rome Laboratory by KSC, Inc.), our MUC-3 scores would certainly have been substantially better, because all components of the DBG system would have been fully functional (see the discussion on functionality of the DBG version currently under development below). However, we felt strongly that the time had come to replace our chart parser with weighted rules by a more powerful and generic model that would provide a better foundation for current work, including automated translation and the integration of speech processing with the DBG system, as well as for the complex MUC-3 messages.

DTIC

Hierarchies; Machine Translation; Semantics

20070003056 Pennsylvania Univ., Philadelphia, PA USA

Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing

Schabes, Yves; Joshi, Aravind K; Jan 1990; 7 pp.; In English

Contract(s)/Grant(s): N0014-85-K-0018; DAAL03-89-C-0031

Report No.(s): AD-A458891; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458891>; Avail.: CASI: A02,

Hardcopy

ABSTRACT During the past year there have been two very significant developments in the area of Tree Adjoining Grammars (TAGs). The first development is a variant of TAGs, called synchronous TAGs, which allows TAG to be used beyond the confines of syntax by characterizing correspondences between languages. The formalism’s intended usage is to relate expressions of natural languages to their associated semantics represented by a logical form language in TAG, or to their translates in another natural language. The formalism is incremental and inherently nondirectional. We will show by detailed examples the working of synchronous TAGs and some of its applications, for example in generation and in machine translation. The second development is the design of LR-style parsers for TAGs. LR parsing strategies evolved out of the original work of Knuth. Even though they are not powerful enough for NLP, they have found use in natural language processing (OVLP) by solving by pseudo-parallelism conflicts between multiple choices. This gives rise to a class of powerful yet efficient parsers for natural language. In order to extend the LR techniques to TAGs it is necessary to find bottom-up automaton that is exactly equivalent to TAGs. This is precisely what has been achieved by the discovery of the Bottom-up Embedded Push Down Automaton (BEPDA). Using BEPDA, deterministic left to right parsers for the Tree Adjoining Languages have been developed.

DTIC

Grammars; Machine Translation; Natural Language (Computers); Semantics

20070003137 Army Research Inst. of Environmental Medicine, Natick, MA USA

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations

Tharion, William J; Kaushik, Sangeeta; Nov 2006; 59 pp.; In English

Report No.(s): AD-A459019; USARIEM-TR-T07-04; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459019>;

Avail.: CASI: A04, Hardcopy

The Warfighter Physiological Status Monitoring (WPSM) system collects vital sign information and other event information. This information is sent wirelessly to a personal digital assistant (PDA) held by the medic. The primary purpose of this study was to determine what features should be included in the graphical user interface (GUI) of the WPSM system as it would appear on the Battlefield Medical Information System-Tactical (BMIS-T) PDA. To meet this objective, information was obtained from 26 experienced combat medics. A background questionnaire was administered to obtain information regarding the volunteers’ medical experience, types of injuries and illnesses observed or treated, and how medical decisions such as triage assessments are made during combat. Secondly, these volunteers were asked to design individual GUI screens after being provided a briefing on what the WPSM system is. Finally, four focus groups of between 4 and 7 medics provided group consensus feedback on what the GUIs for the WPSM system should look like. Results from the volunteers’ individual GUI designs and focus group sessions revealed most medics wanted a (1) geo-location screen, (2) a screen summarizing the medical status of the squad or platoon they were monitoring, (3) an individual patient screen, (4) a treatment and evacuation information screen, (5) an electronic Field Medical Card (FMC), and (6) a reference information screen.

DTIC

Combat; Graphical User Interface; Physiological Effects; Physiology; Portable Equipment

20070003269 Army Research Lab., Aberdeen Proving Ground, MD USA

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed

Krausman, Andrea s; White, Timothy L; Dec 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-70

Report No.(s): AD-A459260; ARL-TR-3998; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459260>; Avail.:

CASI: A03, Hardcopy

This study examined the issues related to tactile displays and the detectability of vibrotactile patterns as combat assault maneuvers were being performed. Three obstacles were used in this study: tires, windows, and high crawl. A baseline condition, in which participants received tactile patterns while standing, was also included in the analysis. In the baseline condition, participants detected and identified 100% of the tactile patterns. Analysis of the obstacle data showed that the obstacles had a significant effect on the detection and identification of the tactile signals. Participants detected 62.5% of the tactile patterns during the high crawl, which was significantly lower than for the tires and windows, with 92% and 88% of signals detected, respectively. With regard to the correct identification of tactile patterns, participants correctly identified 51% of the patterns during the high crawl, as compared to 88.5% for the tires and 77% for the windows. There were no significant differences in the response times.

DTIC

Attacking (Assaulting); Combat; Detection; Display Devices; Human Factors Engineering; Maneuvers; Pattern Recognition

20070003275 Air Force Research Lab., Brooks AFB, TX USA

A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems

Karwowski, Waldemar; Haas, Michael; Salvendy, Gavriel; Aug 2006; 109 pp.; In English

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

Report No.(s): AD-A459269; AFRL-HE-WP-TR-2006-0123; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459269>; Avail.: CASI: A06, Hardcopy

This report reviews literature through 2003 on the design of adaptive human-computer interfaces for the control of complex systems and their application in a variety of domains, including control of technological systems, process control, aviation systems, flight navigation, database design and management, and computer software development and utilization. It is concluded that a significant portion of the current application literature focuses on the user-model construction, the control mechanisms, and technical aspects of the interface architecture. The cognitive aspects of the user-model that are utilized to drive system adaptation are in most cases intuitive and underdeveloped. Also, human information perception and cognitive processing is seldom considered in the design of adaptive human-computer interfaces. Application of soft computing methodologies and techniques is one of the more promising new approaches in this area of research.

DTIC

Adaptation; Complex Systems; Control; Human-Computer Interface

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*.

20070002553 National Cancer Inst., Bethesda, MD, USA

Improving the Communication of Geographic Patterns of Disease through Computer-Based Tools

Williams, L.; Aug. 10, 2005; 40 pp.; In English

Report No.(s): PB2007-102270; No Copyright; Avail.: National Technical Information Service (NTIS)

No abstract available

Computer Techniques; Diseases; Reading

20070002569 Lawrence Livermore National Lab., Livermore, CA USA

Power of Partnership

Hazi, A.; Sep. 21, 2005; 18 pp.; In English

Report No.(s): DE2006-885142; UCRL-TR-215562; No Copyright; Avail.: National Technical Information Service (NTIS)

Institutions Lawrence Livermore National Laboratory conduct similar or complementary research often excel through collaboration. Indeed, much of Lawrence Livermore's research involves collaboration with other institutions, including

universities, other national laboratories, government agencies, and private industry. In particular, Livermore's strategic collaborations with other University of California (UC) campuses have proven exceptionally successful in combining basic science and applied multidisciplinary research. In joint projects, the collaborating institutions benefit from sharing expertise and resources as they work toward their distinctive missions in education, research, and public service. As Laboratory scientists and engineers identify resources needed to conduct their work, they often turn to university researchers with complementary expertise. Successful projects can expand in scope to include additional scientists and engineers both from the Laboratory and from UC, and these projects may become an important element of the research portfolios of the cognizant Livermore directorate and the university department. Additional funding may be provided to broaden or deepen a research project or perhaps develop it for transfer to the private sector for commercial release.

NTIS

Security; California; Multidisciplinary Research

20070002575 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

NERSC Sustained System Performance (SSP) Metric

Kramer, W. T.; Shalf, J. M.; Strohmaier, E.; Sep. 18, 2005; 6 pp.; In English

Report No.(s): DE2006-861982; No Copyright; Avail.: National Technical Information Service (NTIS)

Most plans and reports recently discuss only one of four distinct purposes benchmarks are used. The obvious purpose is selection of a system from among its competitors, something that is the main focus of this paper. This purpose is well discussed in many workshops and reports. The second use of benchmarks is validating the selected system actually works the way expected once it arrives. This purpose may be more important than the first reason. The second purpose is particularly key when systems are specified and selected based on performance projections rather than actual runs on the actual hardware. The third use of benchmarks, seldom mentioned, is to assure the system performs as expected throughout its lifetime, (e.g. after upgrades, changes, and regular use.) Finally, benchmarks are used to guide system designs, something covered in detail in a companion paper from Berkeley's Institute for Performance Studies (BIPS).

NTIS

Computers; Computer Systems Performance

20070002579 National Center for Missing and Exploited Children, Arlington, VA, USA

Online Victimization of Youth: Five Years Later

Wolak, J.; Mitchell, K.; Finkelhor, D.; January 2006; 96 pp.; In English

Contract(s)/Grant(s): OJJDP-2005-MC-CX-K024

Report No.(s): PB2007-102281; Copyright; Avail.: National Technical Information Service (NTIS)

The Internet holds tremendous potential for our nation's youth; however, the misuse of the Internet to prey on them is a serious problem requiring action by legislators, families, communities, and law enforcement. While we have made some strides in helping to prevent such victimization, the results of this survey, Online Victimization of Youth: Five Years Later, shows we have not done enough. Exposure to unwanted sexual material, sexual solicitations, and harassment were frequently reported by the youth interviewed for this study. While we are encouraged by the smaller proportion of youth who received unwanted sexual solicitations, we are disturbed by a new trend of solicitors asking youth to provide sexual pictures of themselves. These results call for a more aggressive prevention plan. While we strongly believe in the power of the Internet to provide valuable information for those of all ages, we also believe children need extra attention and guidance as they venture online, because they, more than any other group of the population, are most vulnerable to risks found on the Internet.

NTIS

Computer Networks; Internets; Safety; Youth; On-Line Systems

20070002624 National Center for Missing and Exploited Children, Arlington, VA, USA

Online Victimization: A Report on the Nation's Youth

Finkelhor, D.; Mitchell, K. J.; Wolak, J.; Jun. 2000; 59 pp.; In English

Contract(s)/Grant(s): OJJDP-98-MC-CX-K002

Report No.(s): PB2007-102283; Copyright; Avail.: National Technical Information Service (NTIS)

Young people go to the internet to learn, play, meet people, and explore the world. But stories from law-enforcement officials, parents, and young people themselves suggest that not every online adventure is a happy one. The internet has a seamier side that young people seem to be encountering with great frequency. The online survey 'Online Victimization : A Report on the Nation's Youth' confirms many of the stories. Large numbers of young people are encountering sexual

solicitations they did not want, sexual material they did not seek, and people who threatened and harassed them in a variety of ways. This report describes the variety of disconcerting experiences young Internet users say they have online and ways they react. It also provides a window into how families and young people are addressing matters of danger and protection on the Internet.

NTIS

Children; Internets; Youth; Law (Jurisprudence)

20070002675 Wufeng Technology of Institute, Chiayi, Taiwan

An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design

Chen, Chia-Chong; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 791-799; In English; See also 20070002673

Contract(s)/Grant(s): NSC-95-2221-E-274-004; Copyright; Avail.: Other Sources

In this paper, an efficient genetic algorithm (EGA) of the Takagi-Sugeno-Kang (TSK) -type neural fuzzy identifier (TNFI) is proposed for solving various identification problems. For the proposed EGA method, the better chromosomes will be initially generated while the better mutation points will be determined to perform efficient mutation. The advantages of the proposed learning algorithm are that, first, it converges quickly and the obtained fuzzy rules are precise. Secondly, the proposed EGA method only requires a small population sizes.

Author

Genetic Algorithms; Machine Learning; Chromosomes

20070002686 National Kinmen Inst. of Tech., Kinmen, Taiwan, Province of China

Robust Mixed H₂/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach

Chen, Jeng-Der; Journal of The Chinese Institute of Engineers, Volume 29, No. 5; September 2006, pp. 933-939; In English; See also 20070002673

Contract(s)/Grant(s): NSC 94-2213-E-507-002; Copyright; Avail.: Other Sources

In this paper, the problem of designing a robust mixed H₂/H(infinity), controller for a class of uncertain neutral state-input delays system is considered. Based on Lyapunov- Krasavskii functional theory, a delay-dependent criterion is derived for the existence of a desired mixed H₂/H(infinity), controller, which can be easily constructed by certain feasible linear matrix inequalities (LMIs). Furthermore, a convex optimization problem is formulated to solve for a robust mixed H₂/H(infinity), controller which achieves the minimization of an upper bound of the closed-loop H₂ performance measure.

Author

Inequalities; Controllers; Feedback Control; Delay; Robustness (Mathematics)

20070002750 Lawrence Livermore National Lab., Livermore, CA USA

Token Ring Protocol for Dynamic Ad-hoc Wireless Environments

Top, P.; Kohlhepp, V.; Dowla, F.; Oct. 10, 2005; 14 pp.; In English

Report No.(s): DE2006-885369; UCRL-CONF-216013; No Copyright; Avail.: Department of Energy Information Bridge

A wireless ad-hoc networking protocol is presented. The protocol is designed to be flexible, easy to use and adaptable to a wide variety of potential applications. The primary considerations in design are small code size, guaranteed bandwidth access, limited delay, and error resilience in a highly dynamic ad-hoc environment. These considerations are achieved through the use of token ring protocol.

NTIS

Computer Networks; Protocol (Computers)

20070002751 Lawrence Livermore National Lab., Livermore, CA USA

Graph-Based Methods for Orbit Classification

Bagherjeiran, A.; Kamath, C.; Oct. 03, 2005; 18 pp.; In English

Report No.(s): DE2006-885368; UCRL-CONF-215802; No Copyright; Avail.: National Technical Information Service (NTIS)

An important step in the quest for low-cost fusion power is the ability to perform and analyze experiments in prototype fusion reactors. One of the tasks in the analysis of experimental data is the classification of orbits in Poincare plots. These plots are generated by the particles in a fusion reactor as they move within the toroidal device. In this paper, we describe the use

of graph-based methods to extract features from orbits. These features are then used to classify the orbits into several categories. Our results show that existing machine learning algorithms are successful in classifying orbits with few points, a situation which can arise in data from experiments.

NTIS

Classifications; Fusion Reactors

20070002755 Wilmer Cutler Pickering Hale and Dorr LLP, New York, NY, USA

Methods and Systems for Autonomously Managing a Network

Konstantinou, A. V.; Yemeni, Y.; 23 Aug 04; 30 pp.; In English

Contract(s)/Grant(s): DARPA-DABT63-96-C-0088

Patent Info.: Filed Filed 23 Aug 04; US-Patent-Appl-SN-10-925 557

Report No.(s): PB2007-100874; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Methods and systems for autonomously managing computer networks are provided. In a preferred embodiment of the invention, management functions are organized in a novel two-layer peer-to-peer (P2P) architecture. The bottom layer organizes management information in a unified object-relationship model, that is instantiated in a distributed transactional object repository. The top layer unifies the traditional roles of managers and elements into a single autonomic management peering layer. Autonomic elements use the repository as a primary management repository, and effect autonomic behavior in terms of transactions over the shared model state. A novel autonomic policy model and language, Object Spreadsheet Language (OSI), in the form of acyclic spreadsheet change propagation rules and declarative constraints is also provided.

NTIS

Computer Networks; Patent Applications; Spreadsheets

20070002759 Lawrence Livermore National Lab., Livermore, CA USA

Topology-Based Simplification for Feature Extraction from 3D Scalar Fields

Gyulaasy, A.; Natarajan, V.; Pascucci, V.; Bermer, P. T.; Hamann, B.; Oct. 15, 2005; 14 pp.; In English

Report No.(s): DE2006-885411; UCRL-PROC-216195; No Copyright; Avail.: National Technical Information Service (NTIS)

This paper describes a topological approach for simplifying continuous functions defined on volumetric domains. We present a combinatorial algorithm that simplifies the Morse-Smale complex by repeated application of two atomic operations that removes pairs of critical points. The Morse-Smale complex is a topological data structure that provides a compact representation of gradient flows between critical points of a function. Critical points paired by the Morse-Smale complex identify topological features and their importance. The simplification procedure leaves important critical points untouched, and is therefore useful for extracting desirable features. We also present a visualization of the simplified topology.

NTIS

Domains; Pattern Recognition; Scalars; Simplification; Topology

20070002763 Lawrence Livermore National Lab., Livermore, CA USA

Volumetric Data Analysis Using Morse-Smale Complexes

Natarajan, V.; Pascucci, V.; Oct. 17, 2005; 12 pp.; In English

Report No.(s): DE2006-885402; No Copyright; Avail.: National Technical Information Service (NTIS)

The 3D Morse-Smale complex is a fundamental topological construct that partitions the domain of a real-valued function into regions having uniform gradient flow behavior. In this paper, we consider the construction and selective presentation of cells of the Morse-Smale complex and their use in the analysis and visualization of scientific datasets. We take advantage of the fact that cells of different dimension often characterize different types of features present in the data. For example, critical points pinpoint changes in topology by showing where components of the level sets are created, destroyed or modified in genus. Edges of the Morse-Smale complex extract filament-like features that are not explicitly modeled in the original data. Interactive selection and rendering of portions of the Morse-Smale complex introduces fundamental data management challenges due to the unstructured nature of the complex even for structured inputs. We describe a data structure that stores the Morse-Smale complex and allows efficient selective traversal of regions of interest. Finally, we illustrate the practical use of this approach by applying it to cryo-electron microscopy data of protein molecules.

NTIS

Volumetric Analysis; Data Processing

20070002767 Lawrence Livermore National Lab., Livermore, CA USA

Graphical Representation of Temporal Data from Simulations

Eder, E. F.; Harrison, C. D.; Oct. 14, 2005; 14 pp.; In English

Report No.(s): DE2006-885393; UCRL-TR-216185; No Copyright; Avail.: National Technical Information Service (NTIS)

The analysis of extremely large data sets is time-consuming and tedious. In this project, we create two tools, the Image Inspector and the Video Inspector, to aid in the automated analysis of 3D temporal data from simulations. Our problem is the 3-dimensional time varying data of the Rayleigh-Taylor instability in a fluid mix problem. We examine the bubble dynamics due to the acceleration of gravity in an initially perturbed interface between a heavier and lighter fluid. Through the use of OpenGL and C++, we automate the capture of the temporal dependence of selected features along a chosen path in a time-dependent 3D simulation. The selected feature, e.g., the height of a bubble, is displayed graphically as a function of position and time. The path can be chosen arbitrarily; differing from previous projects which required the use of horizontal or vertical orientation.

NTIS

Data Simulation; Graphs (Charts)

20070002781 Oak Ridge National Lab., TN USA

Multiple Walkers in the Wang-Landau Algorithm

Brown, G.; Schulthess, T. C.; Elwasif, W. R.; Bernoldt, D. E.; Jan. 2006; 20 pp.; In English

Report No.(s): DE2006-885956; ORNL/TM-2005/1; No Copyright; Avail.: National Technical Information Service (NTIS)

The mean cost for converging an estimated density of states using the Wang-Landau algorithm is measured for the Ising and Heisenberg models. The cost increases in a power-law fashion with the number of spins, with an exponent near 3 for one-dimensional models, and closer to 2.4 for two-dimensional models. The effect of multiple, simultaneous walkers on the cost is also measured. For the one-dimensional Ising model the cost can increase with the number of walkers for large systems. For both the Ising and Heisenberg models in two-dimensions, no adverse impact on the cost is observed. Thus multiple walkers is a strategy that should scale well in a parallel computing environment for many models of magnetic materials.

NTIS

Algorithms; Estimating; Costs; Ising Model

20070002801 Government Accountability Office, Washington, DC, USA

Information Technology: DOD Needs to Ensure that Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers

Dec. 2006; 114 pp.; In English

Report No.(s): PB2007-103683; GAO-07-51; No Copyright; Avail.: CASI: [A06](#), Hardcopy

The Navy Marine Corps Intranet (NMCI) is a 10-year, \$9.3 billion information technology services program. Through a performance-based contract, the Navy is buying network (intranet), application, and other hardware and software services at a fixed price per unit (or 'seat') to support about 550 sites. GAO prepared this report under the Comptroller General's authority as part of a continued effort to assist Congress and reviewed (1) whether the program is meeting its strategic goals, (2) the extent to which the contractor is meeting service level agreements, (3) whether customers are satisfied with the program, and (4) what is being done to improve customer satisfaction. To accomplish this, GAO reviewed key program and contract performance management-related plans, measures, and data and interviewed NMCI program and contractor officials, as well as NMCI customers at shipyards and air depots.

NTIS

Computer Networks; Information Systems; Navy

20070002862 World Technology Evaluation Center, Baltimore, MD, USA

WTEC Panel Report on High-End Computing Research and Development in Japan

Trivelpiece, A. W.; Biswas, R.; Dongarra, J.; Paul, P.; Yelick, K.; Dec. 2004; 185 pp.; In English

Contract(s)/Grant(s): NSF-ENG-0104476

Report No.(s): PB2007-103562; Copyright; Avail.: National Technical Information Service (NTIS)

This report presents the findings of a study of high-end computing (HEC) in Japan, one of a series of 60 such WTEC studies of foreign technologies. This study complements others underway at about the same time, all inspired by the achievement of the Japanese Earth Simulator (ES) in taking the lead as the worlds fastest supercomputer in March, 2002. The WTEC panel gathered information by background research and a visit to 22 of the key organizations in Japan. Japan has had

a broad-based strategic effort in high-performance computing over the past decade; the ES is the principal embodiment of that strategic effort. The ES has had a major impact in the Earth sciences, leading to significant advances in the field. ES is now extending its applications to other fields, including biosciences and nanotechnology. However, continued progress in large-scale high-fidelity simulation will require a significant increase in power beyond the ES. Japan has a broadly based and carefully planned but audacious program in advanced scientific simulations. The strategic attack on protein structure, cell simulations, and computational bioscience is especially noteworthy. The Protein Explorer, with its huge increase in power for molecular dynamics, could put Japan into world leadership in this area.

NTIS

Computer Programming; Japan; Software Engineering

20070002876 Government Accountability Office, Washington, DC, USA

Information Security: Agencies Need to Develop and Implement Adequate Policies for Periodic Testing

Oct. 2006; 28 pp.; In English

Report No.(s): PB2007-102990; GAO-07-65; No Copyright; Avail.: CASI: [A03](#), Hardcopy

Agencies rely extensively on computerized information systems and electronic data to carry out their missions. To ensure the security of the information and information systems that support critical operations and infrastructure, federal law and policy require agencies to periodically test and evaluate the effectiveness of their information security controls at least annually. GAO was asked to evaluate the extent to which agencies have adequately designed and effectively implemented policies for testing and evaluating their information security controls. GAO surveyed 24 major federal agencies and analyzed their policies to determine whether the policies address important elements for periodic testing. GAO also examined testing documentation at 6 agencies to assess the quality and effectiveness of testing on 30 systems.

NTIS

Policies; Security; Computer Techniques

20070003485 NASA Ames Research Center, Moffett Field, CA, USA

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains

Barth, Timothy J.; Sethian, James A.; [2006]; 1 pp.; In English; 1997 SIAM Annual Meeting, 14 - 13 Jul. 1997, Stanford University, Stanford California, USA

Contract(s)/Grant(s): RTOP: 519-40-22; No Copyright; Avail.: Other Sources; Abstract Only

Borrowing from techniques developed for conservation law equations, we have developed both monotone and higher order accurate numerical schemes which discretize the Hamilton-Jacobi and level set equations on triangulated domains. The use of unstructured meshes containing triangles (2D) and tetrahedra (3D) easily accommodates mesh adaptation to resolve disparate level set feature scales with a minimal number of solution unknowns. The minisymposium talk will discuss these algorithmic developments and present sample calculations using our adaptive triangulation algorithm applied to various moving interface problems such as etching, deposition, and curvature flow.

Author

Algorithms; Conservation Laws; Hamilton-Jacobi Equation; Triangulation; Numerical Analysis; Domains

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.

20070003021 SRI International Corp., Menlo Park, CA USA

A Common Knowledge Representation for Plan Generation and Reactive Execution

Wilkins, Sr, David E; Jun 9, 1993; 51 pp.; In English

Contract(s)/Grant(s): F30602-91-C-0039; F30602-90-C-0086

Report No.(s): AD-A458835; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458835>; Avail.: CASI: [A04](#), Hardcopy

This paper describes the ACT formalism, which is designed to encode the knowledge required to support both the generation of complex plans and reactive execution of those plans in dynamic environments. ACT is a heuristically adequate representation that is useful in practical applications. It serves as an interlingua for Artificial Intelligence technologies in planning and reactive control. The design of the formalism is discussed and its use in practical applications is demonstrated.

These applications show that the ACT representational constructs have reasonable computational properties and also are adequately expressive.

DTIC

Computer Programming; Control; Decision Support Systems; Formalism; Knowledge Based Systems; Knowledge Representation; Military Operations; Planning; Reactivity; Robotics; Software Engineering

20070003046 Naval Ocean Systems Center, San Diego, CA USA

Overview of the Third Message Understanding Evaluation and Conference

Sundheim, Beth M; Jan 1991; 15 pp.; In English

Report No.(s): AD-A458877; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458877>; Avail.: CASI: [A03](#),

Hardcopy

The Naval Ocean Systems Center (NOSC) has conducted the third in a series of evaluations of English text analysis systems. These evaluations are intended to advance our understanding of the merits of current text analysis techniques, as applied to the performance of a realistic information extraction task. The latest one is also intended to provide insight into information retrieval technology (document retrieval and categorization) used instead of or in concert with language understanding technology. The inputs to the analysis/extraction process consist of naturally-occurring texts that were obtained in the form of electronic messages. The outputs of the process are a set of templates or semantic frames resembling the contents of a partially formatted database. The premise on which these evaluations are based is that task-oriented tests enable straightforward comparisons among systems and provide useful quantitative data on the state of the art in text understanding. The tests are designed to treat the systems under evaluation as black boxes and to point up system performance on discrete aspects of the task as well as on the task overall. These quantitative data can be interpreted in light of information known about each system's text analysis techniques in order to yield qualitative insights into the relative validity of those techniques as applied to the general problem of information extraction. The process of conducting these evaluations has presented great opportunities for examining and improving on the evaluation methodology itself.

DTIC

Conferences; English Language; Information Retrieval; Message Processing; Messages; Textbooks

20070003053 Pennsylvania Univ., Philadelphia, PA USA

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment

Strassel, Stephanie; Maxwell, Mike; Cieri, Christopher; Jan 2003; 30 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458886; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458886>; Avail.: CASI: [A03](#),

Hardcopy

Advances in statistical machine learning encourage language-independent approaches to linguistic technology development. Experiments in porting technologies to handle new natural languages have revealed a great potential for multilingual computing, but also a frustrating lack of linguistic resources for most languages. Recent efforts to address the lack of available resources have focused either on intensive resource development for a small number of languages or development of technologies for rapid porting. The Linguistic Data Consortium recently participated in an experiment falling primarily under the first approach, the surprise language exercise. This article describes linguistic resource creation within this context, including the overall methodology for surveying and collecting language resources, as well as details of the resources developed during the exercise. The article concludes with discussion of a new approach to solving the problem of limited linguistic resources, one that has recently proven effective in identifying core linguistic resources for less common studied languages. MACHINE TRANSLATION, LANGUAGE PARSING and UNDERSTANDING, TEXT ANALYSIS, LINGUISTIC RESOURCES, HINDI, CEBUANO, TRANSLINGUAL INFORMATION ACCESS TECHNOLOGY, MACHINE TRANSLATION, CROSSLANGUAGE INFORMATION RETRIEVAL, INFORMATION EXTRACTION, SUMMARIZATION

DTIC

Data Processing; Linguistics; Machine Translation; Natural Language (Computers); Parsing Algorithms; Texts

20070003055 Pittsburgh Univ., Pittsburgh, PA USA

Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations

Moore, Johanna D; Jan 1993; 7 pp.; In English

Report No.(s): AD-A458889; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458889>; Avail.: CASI: [A02](#),

Hardcopy

ABSTRACT A striking difference between the interactions that students have with human tutors and those they have with computer-based instruction systems is that human tutors frequently refer to their own previous explanations. Based on a study of human-human instructional interactions, we are categorizing the uses of previous discourse and are developing a computational model of this behavior. In this paper, I describe the strategies we have implemented for identifying relevant prior explanations, and the mechanisms that enable our text planner to exploit the information stored in its discourse history in order to omit information that has previously been communicated, to point out similarities and differences between entities and situations, and to mark re-explanations in circumstances where they are deemed appropriate.

DTIC

Educational Resources; Human-Computer Interface; Learning; Natural Language (Computers); Sensitivity; Speech

20070003061 SRI International Corp., Menlo Park, CA USA

Reasoning About Programs

Waldinger, R J; Levitt, K N; Mar 1974; 125 pp.; In English

Contract(s)/Grant(s): DAHC04-72-C-0008; NSF-GJ-36146

Report No.(s): AD-A458898; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458898>; Avail.: CASI: A06, Hardcopy

This paper describes a theorem prover that embodies knowledge about programming constructs, such as numbers, arrays, lists, and expressions. The program can reason about these concepts and is used as part of a program verification system that uses the Floyd-Naur explication of program semantics. It is implemented in the QA4 language; the QA4 system allows many pieces of strategic knowledge, each expressed as a small program, to be coordinated so that a program stands forward when it is relevant to the problem at hand. The language allows clear, concise representation of this sort of knowledge. The QA4 system also has special facilities for dealing with commutative functions, ordering relations, and equivalence relations, these features are heavily used in this deductive system. The program interrogates the user and asks his advice in the course of a proof. Verifications have been found for Hoare's FIND program, a real-number division algorithm, and some sort programs, as well as for many simpler algorithms. Additional theorems have been proved about a pattern matcher and a version of Robinson's unification algorithm. The appendix contains a complete, annotated listing of the deductive system and annotated traces of several of the deductions performed by the system.

DTIC

Computer Programming; Computer Programs

20070003083 Maryland Univ., College Park, MD USA

Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation

Habash, Nizar; Dorr, Bonnie; May 2002; 12 pp.; In English

Contract(s)/Grant(s): MDA9049-C6-1250; FCPO.810548265

Report No.(s): AD-A458925; LAMP-TR-088; CS-TR-4369; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458925>; Avail.: CASI: A03, Hardcopy

This paper describes a novel approach to handling translation divergences in a Generation-Heavy Hybrid Machine Translation (GHMT) system. The translation divergence problem is usually reserved for Transfer and Interlingual MT because it requires a large combination of complex lexical and structural mappings. A major requirement of these approaches is the accessibility of large amounts of explicit symmetrical knowledge for both source and target languages. This limitation renders Transfer and Interlingual approaches ineffective in the face of structurally-divergent language pairs with asymmetrical resources. GHMT addresses the more common form of this problem, source-poor/target-rich, by fully exploiting symbolic and statistical target-language resources. This is accomplished by using target-language lexical semantics, categorial variations and subcategorization frames to overgenerate multiple lexico-structural variations from a target-glossed syntactic dependency of the source-language sentence. The symbolic over-generation, which accounts for different possible translation divergences, is constrained by a statistical target-language model.

DTIC

Machine Translation; Mathematical Models; Semantics; Statistical Analysis; Translating

20070003126 Mitre Corp., Bedford, MA USA

Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software

Bayer, Samuel; Doran, Christine; George, Bryan; Jan 2001; 4 pp.; In English

Contract(s)/Grant(s): DAAB07-99-C201

Report No.(s): AD-A458993; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458993>; Avail.: CASI: [A01](#),
Hardcopy

To support engaging human users in robust, mixed-initiative speech dialogue interactions which reach beyond current capabilities in dialogue systems, the DARPA Communicator program [1] is funding the development of a distributed message-passing infrastructure for dialogue systems which all Communicator participants are using. In this presentation, we describe the features of and requirements for a genuinely useful software infrastructure for this purpose.

DTIC

Computer Programs; Message Processing; Voice Communication

20070003139 Carnegie-Mellon Univ., Pittsburgh, PA USA

Lightweight Structure in Text

Miller, Robert C; May 2002; 342 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAH04-95-1-0552; DAAD17-99-C-0061

Report No.(s): AD-A459021; CMU-CS-02-134; CMU-HCII-02-103; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459021>; Avail.: CASI: [A15](#), Hardcopy

Pattern matching is heavily used for searching, filtering, and transforming text, but existing pattern languages offer few opportunities for reuse. Lightweight structure is a new approach that solves the reuse problem. Lightweight structure has three parts: a model of text structure as contiguous segments of text, or regions; an extensible library of structure abstractions (e.g., HTML elements, Java expressions, or English sentences) that can be implemented by any kind of pattern or parser; and a region algebra for composing and reusing structure abstractions. Lightweight structure does for text pattern matching what procedure abstraction does for programming, enabling construction of a reusable library. Lightweight structure has been implemented in LAPIS, a web browser/text editor that demonstrates several novel techniques: Text constraints is a new pattern language for composing structure abstractions, based on the region algebra. Text constraint patterns are simple and high-level, and user studies have shown that users can generate and comprehend them. Simultaneous editing uses multiple selections for repetitive text editing. Multiple selections are inferred from examples given by the user, drawing on the lightweight structure library to make fast, accurate, domain-specific inferences from very few examples. In user studies, simultaneous editing required only 1.26 examples per selection, approaching the 1-example ideal. Outlier finding draws the user's attention to inconsistent selections or pattern matches both possible false positives and possible false negatives. When integrated into simultaneous editing and tested in a user study, outlier finding reduced user errors. Unix tools for structured text extend tools like grep and sort with lightweight structure, and the browser shell integrates a Unix command prompt into a web browser, offering new ways to build pipelines and automate web browsing.

DTIC

Data Processing; Texts

20070003187 Nebraska Univ., Lincoln, NE USA

Carving Differential Unit Test Cases from System Test Cases

Elbaum, Sebastian; Chin, Hui N; Dwyer, Matthew B; Dokulil, Jonathan; Jan 2006; 12 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0104

Report No.(s): AD-A459093; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459093>; Avail.: CASI: [A03](#),

Hardcopy

Unit test cases are focused and efficient. System tests are effective at exercising complex usage patterns. Differential unit tests (DUT) are a hybrid of unit and system tests. They are generated by carving the system components, while executing a system test case, that influence the behavior of the target unit, and then re-assembling those components so that the unit can be exercised as it was by the system test. We conjecture that DUTs retain some of the advantages of unit tests, can be automatically and inexpensively generated, and have the potential for revealing faults related to intricate system executions. In this paper, we present a framework for automatically carving and replaying DUTs that accounts for a wide-variety of strategies, we implement an instance of the framework with several techniques to mitigate test cost and enhance flexibility, and we empirically assess the efficacy of carving and replaying DUTs.

DTIC

Computer Programming; Software Engineering

20070003201 Idaho Univ., Moscow, ID USA

Using SPARK-Ada to Model and Verify a MILS Message Router

Rossebo, Bryan; Oman, Paul; Alves-Foss, Jim; Blue, Ryan; Jaszkwiaak, Paul; Jan 2006; 9 pp.; In English

Contract(s)/Grant(s): F30602-02-1-0178; DUE-0114016

Report No.(s): AD-A459119; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459119>; Avail.: CASI: A02, Hardcopy

The concept of information classification is used by all nations to control information distribution and access. In the USA this is referred to as Multiple Levels of Security (MLS), which includes designations for unclassified, confidential, secret, and top secret information. The U.S. Department of Defense has traditionally implemented MLS separation via discrete physical devices, but with the transformation of military doctrine to net-centric warfare, the desire to have a single device capable of Multiple Independent Levels of Security (MILS) emerged. In this paper we present a formal model of a MILS message router using SPARK-ADA. The model is presented as a case study for the design and verification of high assurance computing systems in the presence of an underlying separation kernel. We utilized the correctness-by-design approach to secure system development and discuss the limitations of that approach for the type of system we model.

DTIC

Ada (Programming Language); Classifications; Messages; Program Verification (Computers); Sparks

20070003206 University of Southern California, Marina del Rey, CA USA

Evaluation of Multi-Party Reality Dialogue Interaction

Traum, David R; Robinson, Susan; Stephan, Jens; Jan 2006; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-00-D-0046

Report No.(s): AD-A459142; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459142>; Avail.: CASI: A01, Hardcopy

We describe a dialogue evaluation plan for a multi-character virtual reality training simulation. A multi-component evaluation plan is presented, including user satisfaction, intended task completion, recognition rate, and a new annotation scheme for appropriateness. Preliminary results for formative tests are also presented.

DTIC

Education; Simulation; Virtual Reality

20070003214 University of Southern California, Marina del Rey, CA USA

Branching Storylines in Virtual Reality Environments for Leadership Development

Gordon, Andrew; van Lent, Mike; van Velsen, Martin; Carpenter, Paul; Jhala, Arnav; Jan 2006; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459155; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459155>; Avail.: CASI: A02, Hardcopy

Simulation-based training is increasingly being used within the military to practice and develop the skills of successful soldiers. For the skills associated with successful military leadership, our inability to model human behavior to the necessary degree of fidelity in constructive simulations requires that new interactive designs be developed. The ICT Leaders project supports leadership development through the use of branching storylines realized within a virtual reality environment. Trainees assume a role in a fictional scenario, where the decisions that they make in this environment ultimately affect the success of a mission. All trainee decisions are made in the context of natural language conversations with virtual characters. The ICT Leaders project advances a new form of interactive training by incorporating a suite of Artificial Intelligence technologies, including control architectures, agents of mixed autonomy, and natural language processing algorithms.

DTIC

Artificial Intelligence; Computerized Simulation; Education; Leadership; Virtual Reality

20070003219 University of Southern California, Marina del Rey, CA USA

Controlling the Focus of Perceptual Attention in Embodied Conversational Agents

Kim, Youngjun; Hill, Jr, Randall W; Traum, David R; Jul 2005; 3 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459162; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459162>; Avail.: CASI: A01, Hardcopy

In this paper, the authors present a computational model of dynamic perceptual attention for virtual humans. The computational models of perceptual attention that they surveyed fell into one of two camps: top-down and bottom-up. Biologically inspired computational models typically focus on the bottom-up aspects of attention, while most virtual humans implement a top-down form of attention. Bottom-up attention models only consider the image information without taking into consideration saliency based on tasks or goals. As a result, the outcome of a purely bottom-up model will not consistently match the behavior of real humans in certain situations. Modeling perceptual attention as a purely top-down process, however, also is not sufficient for implementing a virtual human. A purely top-down model does not take into account the fact that virtual humans need to react to perceptual stimuli vying for attention. Top-down systems typically handle this in an ad hoc manner by encoding special rules to catch certain conditions in the environment. The problem with this approach is that it does not provide a principled way of integrating the ever-present bottom-up perceptual stimuli with top-down control of attention. The model presented here extends the prior model introduced by D. Traum and J. Rickel with perceptual resolution based on psychological theories of human perception. This model allows virtual humans to dynamically interact with objects and other individuals, balancing the demands of goal-directed behavior with those of attending to novel stimuli. The model has been implemented and tested with the MRE Project.

DTIC

Computer Vision; Image Processing; Mathematical Models; Virtual Reality

20070003236 University of Southern California, Marina del Rey, CA USA

Increasing Replayability with Deliberative and Reactive Planning

Lent, Michael van; Riedl, Mark O; Carpenter, Paul; McAlinden, Ryan; Brobst, Paul; Jan 2006; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459203; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459203>; Avail.: CASI: A02,

Hardcopy

Opponent behavior in today's computer games is often the result of a static set of Artificial Intelligence (AI) behaviors or a fixed AI script. While this ensures that the behavior is reasonably intelligent, it also results in very predictable behavior. This can have an impact on the replayability of entertainment-based games and the educational value of training-based games. This paper proposes a move away from static, scripted AI by using a combination of deliberative and reactive planning. The deliberative planning (or Strategic AI) system creates a novel strategy for the AI opponent before each gaming session. The reactive planning (or Tactical AI) system executes this strategy in real-time and adapts to the player and the environment. These two systems, in conjunction with a future automated director module, form the Adaptive Opponent Architecture. This paper describes the architecture and the details of the deliberative and reactive planning components.

DTIC

Adaptation; Combat; Games; Military Operations; Planning; Reactivity; Simulation; Strategy; War Games

20070003238 University of Southern California, Marina del Rey, CA USA

Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus

Garg, Saurabh; Martinovski, Bilyana; Robinson, Susan; Stephan, Jens; Tetreault, Joel; Traum, David R; Jan 2004; 5 pp.; In English

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459208; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459208>; Avail.: CASI: A01,

Hardcopy

This paper reviews none available transcription annotation tools, considering in particular the special difficulties arising from transcribing and annotating multi-party, multi-model dialogue. Tools are evaluated as to the ability to support the user's annotation scheme, ability to visualize the form of the data, compatibility with other tools, flexibility of data representation, and general user-friendliness.

DTIC

Coding; Speech

20070003240 Army Tank-Automotive and Armaments Command, Warren, MI USA

Pervasive Computing: Why Did the Logistics Soldier Cross the Road?

Salamango, Mark J; Jun 2003; 17 pp.; In English

Report No.(s): AD-A459215; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459215>; Avail.: CASI: A03,

Hardcopy

Enterprise networks are becoming distributed. The central data center has given way to a distributed network environment containing distributed server clusters, edge servers that optimize data process and dissemination, and a new tier of network-enabled devices that provide ubiquitous access. In essence, the network is expanding outward and embracing a series of new processing nodes (e.g., PDAs, cell phones, vehicles, MP3 players, consumer appliances, etc.). These network nodes are called pervasive devices. The goal of pervasive computing (PvC) is to make data and application services available to any authorized user anywhere, anytime, and on any device. This is accomplished through a robust architecture including software abstraction both at the device level and at the back end. In part, abstraction is facilitated through the use of the Java Virtual Machine (JVM). A JVM consists of interpreters and a run-time environment which can read java byte code. It enables the construction of machine and operating system (OS) independent applications and services because there are JVMs for most Operating Systems (OSs). This paper will go over pervasive technology in general, it will review potential considerations, a PvC architecture, and data mining of PvC information. Throughout this paper there are examples of how PvC can be used to impact the Department of Defense (DoD), however its uses are only limited by imagination.

DTIC

Information Retrieval; Logistics; Networks; Radiotelephones; Roads

20070003249 Army Tank-Automotive and Armaments Command, Warren, MI USA
Pervasive Computing (PvC) ... and Its Impact on Next Generation Army Systems

Bailey, Timothy A; Jun 2003; 16 pp.; In English

Report No.(s): AD-A459235; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459235>; Avail.: CASI: [A03](#),
Hardcopy

These charts discuss pervasiving computing, it role in the enterprise, softwarwe architecture, current army enterprise IT architecture, middleware, and its impact on the Army.

DTIC

Computers; Electronic Equipment; Software Development Tools

20070003252 California Univ., Santa Cruz, CA USA

A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes

Garcia-Luna-Aceves, J J; Balasubramanian, Saravanan; Balakrishnan, Ramesh; Jan 2002; 9 pp.; In English

Contract(s)/Grant(s): N66001-00-1-8942

Report No.(s): AD-A459240; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459240>; Avail.: CASI: [A02](#),
Hardcopy

The current architecture of Internet Protocol (IP) multicasting is limited by the early binding of the membership of a router in a multicast group to the packet forwarding decisions the router must make for that group. The authors present a new architecture for IP multicasting that addresses these limitations by decoupling the mechanisms used for group addressing, group creation and management, and multipoint communication within a group. A new protocol is presented for the creation and management of multicast meshes that substitute for the traditional multicast trees as the underlying routing structure for multipoint communication within groups. Using simulation experiments, the overhead of mesh-multicast signaling and its packet-delivery ratios are compared against the overhead incurred with protocol independent multicast, dense mode (PIM-DM) and core-based tree (CBT), which are well-known examples of tree-based multicasting in the Internet.

DTIC

Computer Systems Design; Fault Tolerance; Group Dynamics; Internets; Packet Switching; Protocol (Computers)

20070003299 Pennsylvania Univ., Philadelphia, PA USA

Advanced Tool Integration for Embedded System Assurances

Lee, Insup; Apr 2006; 4 pp.; In English

Contract(s)/Grant(s): DAAD19-01-1-0473

Report No.(s): AD-A459299; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459299>; Avail.: CASI: [A01](#),
Hardcopy

The goal of the project is to develop a principled, model-based, and tool-supported approach to design and implementation of embedded systems with high assurance of reliability. Embedded systems consist of a collection of components that interact with each other and with their environment through sensors and actuators. Embedded systems are characterized by the nature of resource limitations and constraints that need to be considered during development and deployment. Embedded systems have been developed traditionally in an ad-hoc manner by practicing engineers and

programmers. We have developed a framework for the integration of a suite of methods and tools for the specification, analysis, development, testing, prototyping, simulation and monitoring of embedded software. The framework is called HASTEN (High Assurance Systems Tools and Environments) and is based on Systems that support formal specification and verification, test generation from specifications, prototyping and simulation, and run-time monitoring and checking. The technical approach uses mathematical foundations of hybrid systems theory that combines tools from control theory (optimal control, dynamical systems) and software engineering (concurrency, compositionality, model checking).

DTIC

Computer Programming; Software Engineering

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.

20070002948 NASA Dryden Flight Research Center, Edwards, CA, USA

High-Speed Fiber Bragg Grating Interrogation System Development

Parker, Allen R., Jr.; Richards, Lance; Piazza, Anthony; Williams, Gary; 2005 Engineering Annual Report; December 2006, pp. 27-29; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002948>; Avail.: CASI: **A01**, Hardcopy

A high-speed ground-based interrogation system was developed at the NASA Dryden Flight Research Center for the study and characterization of fiber Bragg gratings. The system utilizes a Compact peripheral component interconnect (CompactPCI) tunable laser along with fiber Bragg gratings to measure surface strain. A Dryden-developed wavelength-to-strain algorithm was implemented to maximize computational efficiency resulting in higher sample rates. To validate this system, laboratory tests were performed with fiber optic sensors and collocated conventional strain gages. Test results show that the high speed system represents a viable laboratory interrogation tool for fiber Bragg gratings.

Author

Algorithms; Bragg Gratings; Fiber Optics; High Speed; Interrogation; Data Processing Equipment

20070003022 Ball Aerospace and Technologies Corp., Chantilly, VA USA

Maritime Planning Support System (MPSS) for Fleet Battle Experiment Juliet (FBE-J)

Gardner, Sheldon; Prestipino, Joseph; Filippelli, Lawrence; Jan 2002; 13 pp.; In English; Original contains color illustrations Report No.(s): AD-A458838; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458838>; Avail.: CASI: **A03**, Hardcopy

The Naval Research Laboratory (NRL) and Ball Aerospace & Technologies Corp.(BATC), under funding from ONR-31 and in cooperation with the Naval Warfare Development Command (NWDC), is developing a Prototype Maritime Planning Support System (MPSS). MPSS is part of a multi-year effort by NRL and BATC to develop collaborative planning technology for net-centric warfare. The system is designed for initial use in Fleet Battle Experiment Juliet (FBE-J) to take place during July and August 2002. The main MPSS initiative for FBE-J is to help develop and evaluate a Joint Forces Maritime Component Command (JFMCC) operational C-squared process that will prioritize multiple tasks with limited naval assets and conduct the full range of Effects Based Operations (EBO) in a joint environment. MPSS is a distributed, web-based infrastructure designed to stimulate, coordinate, manage, and monitor the underlying processes (workflow) represented by the JFMCC's planning process including the Joint Maritime Operations Plan, Maritime Support Request (MARSUPREQ), Master Maritime Attack Plan (MMAP), and Maritime Tasking Order(MTO).

DTIC

Support Systems

20070003048 Defence Science and Technology Organisation, Edinburgh, Australia

Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe

Cant, Tony; McCarthy, Jim; Stanley, Robyn; Jul 2006; 62 pp.; In English; Original contains color illustrations Report No.(s): AD-A458879; DSTO-GD-0466; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458879>; Avail.: CASI: **A04**, Hardcopy

It is now well-known that a robust and complete requirements management process is of great benefit in the procurement of complex, critical, software-intensive systems. DOORS is a well-established suite of software made by Telelogic, designed

to maintain large sets of requirements. The HIVE is a project under development by the TCS Group at DSTO that aims to provide a new approach to the creation of technical documents required in system development. It can be used to formulate, manage, and analyse requirements, and then to develop the system design which satisfies them. While the main focus of each piece of software is different, there is enough overlap that users of DOORS would strongly benefit from use of the HIVE. This report highlights the strengths of both tools, compares their major features, and suggests a number of ways the HIVE and DOORS can interact with one another to benefit the user.

DTIC

Computer Systems Programs; Doors; Software Development Tools

20070003065 Yale Univ., New Haven, CT USA

Learning-Based Anomaly Detection in BGP Updates

Zhang, Jian; Rexford, Jennifer; Feigenbaum, Joan; Apr 2005; 13 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-01-1-0795; N00014-04-1-0725

Report No.(s): AD-A458902; YALEU/DCS/TR-1318; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458902>;
Avail.: Defense Technical Information Center (DTIC)

We propose an instance-learning based framework for detecting BGP routing anomalies. By using a vector of quantified features to represent BGP updates, our framework can capture more complex features of BGP updates than previous methods that use simple aggregation. The feature vector is based on BGP-update dynamics and is constructed using wavelet transformations. The transformations provide a systematic, multi-scaled analysis of the dynamics and thus avoid using 'magic numbers' that are hard to determine. We experiment with a preliminary implementation of our framework, investigating daily BGP update behaviors for six months. Focusing on each prefix in isolation, we show that, for most prefixes, update dynamics are similar from day to day. Furthermore, on a single day, most prefixes also display similar dynamics. Only a few prefixes exhibit behaviors that are quite different from the majority. The small set of prefixes or daily behaviors can be further examined for anomaly detection. In particular, we observe that most prefixes whose update dynamics deviate from the majority are unstable prefixes with frequent routing changes.

DTIC

Anomalies; Detection

20070003080 General Accounting Office, Washington, DC USA

Information Technology: DOD Needs to Ensure That Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers

Dec 2006; 115 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458921; GAO-07-51; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458921>; Avail.: CASI: A06, Hardcopy

The Navy Marine Corps Intranet (NMCI) is a 10-year, \$9.3 billion information technology services program. Through a performance-based contract, the Navy is buying network (intranet), application, and other hardware and software services at a fixed price per unit (or seat) to support about 550 sites. GAO prepared this report under the Comptroller General's authority as part of a continued effort to assist Congress and reviewed (1) whether the program is meeting its strategic goals, (2) the extent to which the contractor is meeting service level agreements, (3) whether customers are satisfied with the program, and (4) what is being done to improve customer satisfaction. To accomplish this, GAO reviewed key program and contract performance management-related plans, measures, and data and interviewed NMCI program and contractor officials, as well as NMCI customers at shipyards and air depots.

DTIC

Computer Networks; Navy

20070003116 Odyssey Research Associates, Inc., Ithaca, NY USA

Distinguishing Novel Usage From Novel Attacks

Marceau, Carla; Sep 2006; 17 pp.; In English

Contract(s)/Grant(s): DAAD19-03-C-0060

Report No.(s): AD-A458982; ATC-NY-TR-06-0009; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458982>;
Avail.: CASI: A03, Hardcopy

In this project, ATC-NY is developing methods for evaluating anomalous behavior concurrently with reacting to it. Anomalous events that are not so suspicious as to cause an immediate alarm are continually reexamined in the light of later

events, with the goal of eventually understanding whether they are benign or malign. As time goes on, the IDS should become familiar with common attacks, even while it continually adapts to small changes in normal behavior. By focusing on the long-term problem (building up knowledge), the proposed IDS should become better over time at solving the short-term problem (detecting attacks).

DTIC

Anomalies

20070003125 Yale Univ., New Haven, CT USA

Incentive-Compatible Interdomain Routing

Feigenbaum, Joan; Ramachandran, Vijay; Schapira, Michael; May 2006; 31 pp.; In English

Contract(s)/Grant(s): N00014-01-1-0795; N00014-04-1-0725

Report No.(s): AD-A458992; YALEU/DCS/TR-1342; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458992>;

Avail.: CASI: [A03](#), Hardcopy

The routing of traffic between Internet domains, or Autonomous Systems (ASes), a task known as interdomain routing, is currently handled by the Border Gateway Protocol (BGP). Using BGP, autonomous systems can apply semantically rich routing policies to choose interdomain routes in a distributed fashion. This expressiveness in routing-policy choice supports domains autonomy in network operations and in business decisions, but it comes at a price: The interaction of locally defined routing policies can lead to unexpected global anomalies, including route oscillations or overall protocol divergence. Networking researchers have addressed this problem by devising constraints on policies that guarantee BGP convergence without unduly limiting expressiveness and autonomy. In addition to taking this engineering or protocol-design approach, researchers have approached interdomain routing from an economic or mechanism-design point of view. It is known that lowest-cost-path (LCP) routing can be implemented in a truthful, BGP-compatible manner but that several other natural classes of routing policies cannot. In this paper, we present a natural class of interdomain-routing policies that is more realistic than LCP routing and admits incentive-compatible, BGP-compatible implementation. We also present several positive steps toward a general theory of incentive-compatible interdomain routing.

DTIC

Incentives; Internets; Protocol (Computers)

20070003131 Army Tank-Automotive and Armaments Command, Warren, MI USA

A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants

Bennett, John G; Crile, Jim; Apr 22, 2003; 9 pp.; In English

Report No.(s): AD-A459008; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459008>; Avail.: CASI: [A02](#),

Hardcopy

Field tests to compare camouflage patterns rely on collecting data on the preferences of human observers. The director of such tests has been faced with a choice between using pencil-and-paper ballots or using an expensive data collection system based on push buttons wired to personal computers with custom software. In this paper we describe an alternative system that combines the advantages of digital collection with the simplicity of paper ballots. The key ingredients to the system a personal data assistants (PDA' s) and database software that runs on a PDA. Specifically, our system makes use of Palm Pilots and the commercial database program think DB. Using a stylus, each observer enters his selection of the better camouflage pattern by pushing a radio button on the screen of his Palm Pilot. At the end of the test, the test director uses the Palm HotSync function to transfer the results to a personal computer for analysis.

DTIC

Data Acquisition; Digital Computers; Portable Equipment

20070003135 Carnegie-Mellon Univ., Pittsburgh, PA USA

An Examination of Remote Access Help Desk Cases

Steinfeld, Aaron; Sanghi, Ritika; Giampapa, Joeph; Siewiorek, Daniel; Sycara, Katia; Sep 2003; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0499

Report No.(s): AD-A459012; CMU-CS-03-190; CMU-HCII-03-100; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459012>; Avail.: CASI: [A03](#), Hardcopy

As a precursor to explorations on future network interoperability problem resolution methods and tools, it is necessary to obtain an understanding of problems in the present day. The remote network access application area was chosen as a case

study due to rich sources of information, frequent problems, and considerable detrimental impact on user efficiency. To this end, existing remote network access help desk data was acquired and analyzed. The data was used to characterize remote network access interoperability problems and identify key issues. For the data examined, the two largest problems specific to remote end users were obtaining modem phone numbers for their location and adequate user rights upon connection. Potential for better knowledge re-use and dissemination of solutions to common problems to the general population was also observed.

DTIC

Communication Networks; Remote Control

20070003162 Mitre Corp., Bedford, MA USA

Strand Spaces: Why is a Security Protocol Correct?

Fabrega, F J; Herzog, Jonathan C; Gutman, Joshua D; May 1998; 13 pp.; In English

Contract(s)/Grant(s): DAAB07-96-C-E601

Report No.(s): AD-A459060; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459060>; Avail.: CASI: A03,

Hardcopy

A strand is a sequence of events; it represents either the execution of legitimate party in a security protocol or else a sequence of actions by a penetrator. A strand space is a collection of strands, equipped with a graph structure generated by causal interaction. In this framework, protocol correctness claims may be expressed in terms of the connections between strands of different kinds. In this paper we develop the notion of a strand space. We then prove a generally useful lemma, as a sample result giving a general bound on the abilities of the penetrator in any protocol. We apply the strand space formalism to prove the correctness of the Needham-Schroeder-Lowe protocol. Our approach gives a detailed view of the conditions under which the protocol achieves authentication and protects the secrecy of the values exchanged. We also use our proof methods to explain why the original Needham-Schroeder protocol fails. We believe that our approach is distinguished from other work on protocol verification by the simplicity of the model and the ease of producing intelligible and reliable proofs of protocol correctness even without automated support.

DTIC

Protocol (Computers); Security; Strands

20070003167 Michigan State Univ., East Lansing, MI USA

Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries

Wang, Limin; Kulkarni, Sandeep S; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-01-1-0744

Report No.(s): AD-A459066; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459066>; Avail.: CASI: A02,

Hardcopy

Reprogramming is an essential service for wireless sensor networks. Authenticating reprogramming process is important as sensors need to verify that the code image is truly from a trusted source. There are two ways to achieve authentication: public key based and symmetric key based. Although previous work has shown that public key authentication is feasible on sensor nodes if used sparingly, it is still quite expensive compared to symmetric key based approach. In this paper, we propose a symmetric key-based protocol for authenticating the reprogramming process. Our protocol is based on the secret instantiation algorithm, which requires only $O(\log n)$ keys to be maintained at each sensor. We integrate this algorithm with the existing reprogramming protocol. Through simulation, we show that it is able to authenticate the reprogramming process at very low communication cost, and has very short delay.

DTIC

Computer Information Security; Computer Networks; Wireless Communication

20070003180 Michigan Univ., Ann Arbor, MI USA

Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors

Chen, Zhigang; Cho, Min-gyu; Shin, Kang G; Jan 2006; 15 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0421; CNS-0435023

Report No.(s): AD-A459085; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459085>; Avail.: CASI: A03,

Hardcopy

Location services are essential to many applications running on a hybrid of wirelessly-networked mobile actors and static sensors, such as surveillance systems and the Pursuer and Evader Game (PEG). To our best knowledge, there has been no previous location service protocol for wireless sensor networks. A number of location service protocols have been proposed

for mobile ad hoc networks, but they are not applicable to sensor networks due to the usually large per-hop latency between sensors. In this report, we present a distributed location service protocol (DLSP) for wireless sensor networks. Using a rigorous analysis of DLSP, we derive the condition for achieving a high packet-delivery ratio, and show how to configure the protocol parameters to ensure the scalability of DLSP. We prove that DLSP is scalable if the mobile's speed is below a certain fraction of the packet-transmission speed, which depends on a movement threshold. For example, if the movement threshold for the lowest-level location servers is the same as the radio range, the mobile's speed limit is one-tenth of the packet-transmission speed. The mobile's theoretical speed limit is one-fifth of the packet-transmission speed, beyond which DLSP cannot scale regardless of the movement threshold. Because DLSP suffers from a high location-update overhead, we propose an optimization, called DLSP with the Selected Neighbor (DLSP-SN), which can reduce the update overhead by more than 70%, while achieving a high packet-delivery ratio. Due to the gridding effect, the average packet's path length of DLSP-SN is longer than that of DLSP. This increases data-delivery cost for continuous data streams. In order to make a tradeoff between update and data-delivery costs, we present a greedy adaptation mechanism, called DLSP-ASN, which can make a significant improvement of overall energy-efficiency.

DTIC

Game Theory; Position (Location); Protocol (Computers)

20070003190 Washington Univ., Seattle, WA USA

Secure Localization for Wireless Sensor Networks using Range-Independent Methods

Lazos, Loukas; Poovendran, Radha; Jan 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-05-1-0491

Report No.(s): AD-A459099; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459099>; Avail.: CASI: A03, Hardcopy

Wireless Sensor Networks (WSNs) are envisioned to be integrated into our everyday lives, enabling a wealth of commercial applications such as environmental and habitat monitoring, disaster relief and emergency rescue operations, patient monitoring, as well as military applications such as target detection and tracking. These applications are facilitated by the collaborative processing of the physical properties monitored by the sensors, such as temperature, light, sound, humidity, vibration, acceleration, or air quality. The majority of the localization techniques that are proposed for WSNs are designed to operate in a benign environment with no security threats. However, WSNs may be deployed in hostile environments and operating unsupervised, and hence, are vulnerable to conventional and novel attacks aimed at interrupting the functionality of location-aware applications by exploiting the vulnerabilities of the localization scheme. In this chapter, we study the problem of enabling nodes of a WSN to determine their location even in the presence of malicious adversaries. This problem will be referred to as Secure Localization. We consider secure localization in the context of the following design goals: (a) decentralized implementation, (b) resource efficiency, and (c) robustness against security threats.

DTIC

Computer Networks; Detectors; Position (Location); Wireless Communication

20070003191 Washington Univ., Seattle, WA USA

SeRLoc: Robust Localization for Wireless Sensor Networks

Lazos, Loukas; Poovendran, Radha; Jan 2005; 29 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0242

Report No.(s): AD-A459100; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459100>; Avail.: CASI: A03, Hardcopy

Many distributed monitoring applications of Wireless Sensor Networks (WSNs) require the location information of a sensor node. In this article, we address the problem of enabling nodes of Wireless Sensor Networks to determine their location in an untrusted environment, known as the secure localization problem. We propose a novel range-independent localization algorithm called SeRLoc that is well suited to a resource constrained environment such as a WSN. SeRLoc is a distributed algorithm based on a two-tier network architecture that allows sensors to passively determine their location without interacting with other sensors. We show that SeRLoc is robust against known attacks on WSNs such as the wormhole attack, the Sybil attack, and compromise of network entities and analytically compute the probability of success for each attack. We also compare the performance of SeRLoc with state-of-the-art range-independent localization schemes and show that SeRLoc has better performance.

DTIC

Detectors; Position (Location); Wireless Communication

20070003199 California Univ., Santa Cruz, CA USA

Collision Avoidance and Resolution Multiple Access: First-Success Protocols

Garces, Rodrigo; Garcia-Luna-Aceves, J J; Jan 1997; 6 pp.; In English

Contract(s)/Grant(s): DAAB07-95-C-D157; DAAH04-96-1-0210

Report No.(s): AD-A459116; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459116>; Avail.: CASI: A02,

Hardcopy

Collision avoidance and resolution multiple access (CARMA) protocols establish a three-way handshake between sender and receiver to attempt to avoid collisions, and to resolve any collisions that do occur. This paper describes and analyzes CARMA protocols that resolve collisions up to the first success obtained by running a tree-splitting algorithm for collision resolution. An upper bound for the average costs of resolving collisions of floor requests using the tree-splitting algorithm is obtained and applied to the computation of the average channel utilization in a fully connected network with a large number of stations. This analysis indicates that, because CARMA protocols guarantee a successful transmission for every busy period of the channel, it achieves higher throughput than other contention-based MAC protocols based on collision-avoidance handshakes.

DTIC

Collision Avoidance; Computer Networks; Infrared Tracking; Multiple Access; Packet Switching; Protocol (Computers); Wireless Communication

20070003200 California Univ., Santa Cruz, CA USA

Dynamics of a Loop-Free Path-Finding Algorithm

Murthy, Shree; Garcia-Luna-Aceves, J J; Jan 1995; 6 pp.; In English

Contract(s)/Grant(s): N00014-92-J-1807; F19628-93-C-0175

Report No.(s): AD-A459117; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459117>; Avail.: CASI: A02,

Hardcopy

The dynamics of a loop-free path-finding algorithm (LPA) based on predecessor information and a single-hop internodal synchronization mechanism is investigated. LPA is compared with a loop-free algorithm based on diffusing computations, DUAL, and an ideal link-state (ILS) algorithm based on topology broadcast. Comparisons include the dynamic response of the algorithms to single and multiple link-cost changes as well as single link and router failures and recoveries. The results show that LPA requires a significantly smaller number of messages than ILS and DUAL to update routing tables when multiple changes in link costs occur. LPA's performance is always significantly better than DUAL's and significantly better than ILS's after node failures and resource additions (in some instances, ILS requires almost four times as many messages). After a link failure, LPA requires approximately the same time to converge as ILS and at most twice as many messages.

DTIC

Algorithms; Computer Networks; Dynamic Response; Message Processing; Packet Switching; Protocol (Computers); Wireless Communication

20070003221 University of Southern California, Marina del Rey, CA USA

The Error Is the Clue: Breakdown In Human-Machine Interaction

Martinovsky, Bilyana; Traum, David; Jan 2006; 7 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046

Report No.(s): AD-A459168; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459168>; Avail.: CASI: A02,

Hardcopy

This paper focuses not on the detection and correction of specific errors in the interaction between machines and humans, but rather cases of massive deviation from the user's conversational expectations and desires. This can be the result of too many or too unusual errors, but also from dialogue strategies designed to minimize error, which make the interaction unnatural in other ways. We study causes of irritation such as over-fragmentation, over-clarity, overcoordination, over-directedness, and repetitiveness of verbal action, syntax, and intonation. Human reactions to these irritating features typically appear in the following order: tiredness, tolerance, anger, confusion, irony, humor, exhaustion, uncertainty, lack of desire to communicate. The studied features of human expressions of irritation in nonface- to-face interaction are: intonation, emphatic speech, elliptic speech, speed of speech, extra-linguistic signs, speed of verbal action, and overlap.

DTIC

Errors; Linguistics; Man Machine Systems; Natural Language Processing

20070003251 California Univ., Santa Cruz, CA USA

Multisites Coordination in Shared Multicast Trees

Dommel, H-P; Garcia-Luna-Aceves, J J; Jan 1999; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F19628-96-C-0038

Report No.(s): AD-A459239; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459239>; Avail.: CASI: [A02](#),
Hardcopy

The majority of today's Internet applications rely on point-to-point transmission. In recent years, however, multicast transmission has become the foundation for such applications as multiparty video conferencing, distributed interactive simulations, and collaborative systems. The authors describe a novel protocol to coordinate multipoint groupwork in the IP-multicast framework. The protocol supports Internet-wide coordination for large and highly interactive groupwork, relying on transmission of coordination directives between group members across a shared end-to-end multicast tree. They also describe how addressing extensions to IP multicast can be put to use for their multisite coordination mechanism.

DTIC

Coordination; Group Dynamics; Internets; Packet Switching; Protocol (Computers)

20070003290 Idaho Univ., Moscow, ID USA

Architecture-Based Refinements for Secure Computer Systems Design

Zhou, Jie; Alves-Foss, Jim; Jan 2006; 13 pp.; In English

Contract(s)/Grant(s): F30602-02-1-0178

Report No.(s): AD-A459287; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459287>; Avail.: CASI: [A03](#),
Hardcopy

The successful design and implementation of secure systems must occur from the beginning. A component that must process data at multiple security levels is very critical and must go through additional evaluation to ensure the processing is secure. It is common practice to isolate and separate the processing of data at different levels into different components. In this paper we present architecture-based refinement techniques for the design of multi-level secure systems. We discuss what security requirements must be satisfied through the refinement process, including when separation works and when it does not. The process oriented approach will lead to verified engineering techniques for secure systems, which should greatly reduce the cost of certification of those systems.

DTIC

Computer Information Security; Computer Systems Design

20070003307 California Univ., Santa Cruz, CA USA

A New Hybrid Channel Access Scheme for Ad Hoc Networks

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2002; 6 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330

Report No.(s): AD-A459312; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459312>; Avail.: CASI: [A02](#),
Hardcopy

Many contention-based channel access schemes have been proposed for multi-hop ad hoc networks in the recent past, and they can be divided into two categories, sender-initiated and receiver-initiated, according to the collision avoidance handshake in use. The sender-initiated scheme is adopted in the IEEE 802.11 Medium Access Control (MAC) protocol, which is by far the most popular and studied protocol. However, the IEEE 802.11 MAC protocol can experience serious fairness problems due to location-dependent contention and the binary exponential backoff it uses. On the other hand, a receiver-initiated collision avoidance handshake is more effective at the receiver's side. Hence, the authors propose a hybrid channel access scheme that combines both sender-initiated and receiver-initiated collision avoidance schemes. The new scheme involves only some additional queue management and book-keeping work while maintaining compatibility with the existing IEEE 802.11 protocol. Simulation experiments show that the new scheme is very effective, as it can achieve much better fairness than the original sender-initiated scheme with almost no degradation in throughput. The hybrid scheme also eliminates the need for a good traffic estimator, which is usually mandatory in pure receiver-initiated schemes.

DTIC

Collision Avoidance; Computer Networks; Packet Switching; Protocol (Computers); Wireless Communication

20070003308 California Univ., Santa Cruz, CA USA

Channel Sharing of Competing Flows in Ad Hoc Networks

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2003; 9 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330; DAAD19-01-C-0026

Report No.(s): AD-A459313; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459313>; Avail.: CASI: [A02](#),
Hardcopy

This paper studies the fairness with which competing flows share the channel in ad hoc networks using collision avoidance protocols. It is shown that the required multihop coordination makes the backoff-based distributed fair queueing schemes less effective. Using extensive simulations of two competing flows with different underlying network configurations, it is shown that the commonly used flow contention graph is insufficient to model the contention among nodes and that various degrees of unfairness can take place. The fairness problem is more severe in Transmission Control Protocol (TCP)-based flows due to the required acknowledgment traffic, and TCP throughput also is negatively affected. A measurement-based fair scheme is analyzed in which nodes estimate their fair share of the channel from overheard traffic and adjust their backoff window accordingly (voluntarily). It is shown that such a scheme achieves much better fairness but sacrifices too much throughput. These results indicate that more explicit information exchange among contending nodes is mandatory to solve the fairness problem conclusively while maintaining reasonable throughput.

DTIC

Channel Flow; Collision Avoidance; Protocol (Computers); Queueing Theory; Topology; Wireless Communication

20070003311 California Univ., Santa Cruz, CA USA

Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2002; 11 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330

Report No.(s): AD-A459321; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459321>; Avail.: CASI: [A03](#),
Hardcopy

This paper presents the first analytical model to derive the saturation throughput of collision avoidance protocols in multi-hop ad hoc networks with nodes randomly placed according to a two-dimensional Poisson distribution. The authors show that the sender-initiated collision-avoidance scheme performs much better than the ideal Carrier Sense Multiple Access (CSMA) scheme with a separate channel for acknowledgments. But they also show that the collision-avoidance scheme can accommodate far fewer competing nodes within a region in a network infested with hidden terminals than in fully connected networks or those with just a few hidden terminals, if reasonable throughput is to be maintained. Simulations of the popular IEEE 802.11 MAC protocol show that it cannot ensure collision-free transmission of data packets and, thus, throughput can degrade well below what is predicted by the analysis of a correct collision avoidance protocol. Based on these results, a number of improvements are proposed for the IEEE 802.11 MAC protocol.

DTIC

Collision Avoidance; Computer Networks; Packet Switching; Protocol (Computers); Transmitters; Wireless Communication

20070003312 California Univ., Santa Cruz, CA USA

Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2003; 11 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330; DAAD19-01-C-0026

Report No.(s): AD-A459325; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459325>; Avail.: CASI: [A03](#),
Hardcopy

Three collision-avoidance protocols are analyzed that use omni-directional packet reception together with omni-directional transmissions, directional transmissions, or a combination of both. A simple model is introduced to analyze the performance of these collision avoidance protocols in multi-hop networks with arbitrary topologies. The numerical results of this analysis show that collision avoidance using a narrow antenna beamwidth for the transmission of all control and data packets achieves the highest throughput among the three collision avoidance schemes considered. Simulation experiments of the popular IEEE 802.11 MAC protocol and its variants based on directional transmissions and omni-directional packet reception validate the results predicted in the analysis. The results further show that narrow-beamwidth transmissions also can reduce the average delay experienced by nodes. It is concluded that the advantage of spatial reuse achieved by narrow-beamwidth transmissions outweighs that of conservative collision avoidance schemes featured by the omni-directional transmission of some control packets. This is because the latter requires far more stringent coordination of nodes with their

neighbors and hidden terminals, which can lead to much more channel resource wasted due to nodes' excessive waiting time.
DTIC

Collision Avoidance; Computer Networks; Directional Antennas; Omnidirectional Antennas; Packet Switching; Protocol (Computers)

20070003316 California Univ., Santa Cruz, CA USA

Broadcast Traffic in Ad Hoc Networks with Directional Antennas

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2003; 7 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330; DAAD19-01-C-0026

Report No.(s): AD-A459333; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459333>; Avail.: CASI: [A02](#),
Hardcopy

The authors explore the use of directional antennas to improve the performance of broadcasting in ad hoc networks. They investigate both the performance of unicast traffic in the presence of broadcast traffic, and the performance of broadcast traffic when mixed with unicast traffic, which is different from previous investigations reported in the literature in which broadcast traffic was investigated in isolation. Through extensive simulation experiments with three Medium Access Control (MAC) schemes, they show that throughput and delay can vary widely even in networks in which nodes are uniformly distributed. They also show that the use of a MAC protocol that utilizes directional antennas can help to improve the performance of broadcast traffic in ad hoc networks, in terms of both throughput and delay, through a more aggressive channel access scheme that maximizes spatial reuse.

DTIC

Broadcasting; Collision Avoidance; Directional Antennas; Omnidirectional Antennas; Packet Switching; Protocol (Computers); Topology; Traffic

20070003320 California Univ., Santa Cruz, CA USA

Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas

Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2002; 6 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0330; DAAD19-01-C-0026

Report No.(s): AD-A459345; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459345>; Avail.: CASI: [A02](#),
Hardcopy

The quest for efficient medium access control (MAC) protocols for multi-hop ad hoc networks has aroused great interest in using directional antennas. Some MAC protocols using directional antennas have been proposed in the past, which trade off spatial reuse and collision avoidance via a combination of omni-directional and directional transmission modes. In this paper, the authors argue that the benefit of spatial reuse achieved by a MAC protocol that uses directional mode in all transmissions can outweigh the benefit of a conservative collision avoidance MAC protocol that sends some omni-directional control packets to silence potential interfering nodes. Detailed simulation experiments of the popular IEEE 802.11 MAC protocol and its variants that make use of directional transmission mode in sufficiently random networks are presented. It is concluded that, in contention-based MAC protocols for multi-hop networks infested with hidden terminals, the aggressive channel access scheme featured by all-directional transmissions indeed outperforms other conservative schemes in terms of enhanced throughput and reduced delay.

DTIC

Collision Avoidance; Directional Antennas; Omnidirectional Antennas; Packet Switching; Protocol (Computers); Topology

20070003339 California Univ., Santa Cruz, CA USA

Policy-Aware Connectionless Routing

Smith, Bradley R; Garcia-Luna-Aceves, J J; Jan 2004; 11 pp.; In English

Contract(s)/Grant(s): N66001-00-8942

Report No.(s): AD-A459409; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459409>; Avail.: CASI: [A03](#),
Hardcopy

The current Internet implements hop-by-hop packet forwarding based entirely on globally-unique identifiers specified in packet headers, and routing tables that identify destinations with globally unique identifiers and specify the next hops to such destinations. This model is very robust; however, it supports only a single forwarding class per destination. As a result, the Internet must rely on mechanisms working 'on top' of IP to support quality-of-service (QoS) or traffic engineering (TE). We present the first policy-based connectionless routing architecture and algorithms to support QoS and TE as part of the basic

network-level service of the Internet. We show that policy-aware connectionless routing can be accomplished with roughly the same computational efficiency of the traditional single-path shortest-path routing approach.

DTIC

Communication Networks; Policies

20070003340 California Univ., Santa Cruz, CA USA

Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet

Vutukury, Srinivas; Mar 2001; 153 pp.; In English

Report No.(s): AD-A459410; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459410>; Avail.: CASI: **A08**, Hardcopy

The success of the IP architecture is largely due to the simplicity, robustness and scalability that resulted from its the connectionless design methodology. As the Internet evolves it must support new services such as QoS and when extensions are made to the IP architecture to support such services, its basic connectionless model must be preserved to retain the scalability and robustness that made it so successful. In the past few years, with the Internet becoming the main communication infrastructure IP networks are faced with two challenging problems that require immediate attention: traffic, engineering and supporting guaranteed services providing efficient, robust and scalable solutions to these problems within the framework of the connectionless IP has become extremely important and urgent.

DTIC

Internets; Multipath Transmission; Quality; Traffic

20070003341 Yale Univ., New Haven, CT USA

A Model of Onion Routing With Provable Anonymity

Johnson, Aaron; Aug 30, 2006; 20 pp.; In English

Contract(s)/Grant(s): N00014-01-1-0795; 0428422

Report No.(s): AD-A459411; YALEU/DCS/TR-1368; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459411>; Avail.: CASI: **A03**, Hardcopy

Onion routing is a scheme for anonymous communication that is designed for practical use. It has not been modeled formally, however, and therefore its anonymity guarantees have not been rigorously analyzed. We give an IO-automata model of an onion-routing protocol and, under possibilistic definitions, characterize the situations in which anonymity and unlinkability are guaranteed.

DTIC

Computer Networks; Cryptography; Protocol (Computers)

20070003350 California Univ., Santa Cruz, CA USA

Group Coordination Support in Networked Multimedia Systems

Dommel, Hans-Peter; Dec 1999; 180 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-92-J-1807; F19628-96-C-0038

Report No.(s): AD-A459431; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459431>; Avail.: CASI: **A09**, Hardcopy

Advances in computer hardware and networking technology have incited the deployment of large-scale group-oriented applications for delivery or interactive development of multimedia content in the Internet. There is a growing number of protocols and techniques for group communication and membership services in the IP-multicast framework, however, group coordination support for telecollaborative tasks such as videoconferencing or distributed interactive simulation has received little attention. In this dissertation, we address network control and coordination functions to orchestrate synchronous multimedia groupwork, establishing a sharing discipline on multimedia resources and guaranteeing consistency of distributed activities with ordered multicasting. We introduce a formal framework for group coordination and a turn-taking abstraction useful for evaluating coordination protocols. Elemental design choices for group coordination architectures and the concept of aggregated processing of coordination information are discussed.

DTIC

Coordination; Internets; Multimedia; Networks; Support Systems

20070003353 Stevens Inst. of Tech., Hoboken, NJ USA

Differential Space-Time Modulation for Wideband Wireless Networks

Li, Hongbin; Sep 30, 2006; 7 pp.; In English

Contract(s)/Grant(s): DAAD19-03-1-0184

Report No.(s): AD-A459439; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459439>; Avail.: CASI: A02, Hardcopy

This project investigated differential modulation for broadband wireless communication systems equipped with multiple transmit antennas operating in frequency-selective channels. The objective was to provide full spatio-spectral diversity and coding gain at affordable decoding complexity without the burden of estimating the underlying space-time frequency-selective channel. The authors have developed two differential space-time modulation schemes tailored to frequency-selective channels. These schemes offer different trade-offs in dealing with time-selective versus frequency-selective fading channels. When applied along with a full-diversity spectral code, these schemes achieve full spatio-spectral diversity and significant coding gain. They also have examined the code design problem for the system under consideration, and obtained optimum code design criteria. For practical spectral encoding, they have developed a class of minimum-length full-diversity codes, referred to as linear constellation decimation (LCD) codes, which offer significant coding gain at modest decoding complexity. They also have developed a differential space-time modulation scheme using amplitude-phase shift keying (APSK) symbols, which are more efficient than conventional PSK-based differential space-time techniques.

DTIC

Amplitude Modulation; Broadband; Communication Networks; Frequencies; Modulation; Multichannel Communication; Phase Modulation; Reception Diversity; Wireless Communication

20070003474 MRJ, Inc., USA

Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds

Schmidt, Melisa; Yan, Jerry C.; September 03, 1997; 1 pp.; In English

Contract(s)/Grant(s): NAS2-14303; RTOP 509-10-31; No Copyright; Avail.: Other Sources; Abstract Only

Many performance monitoring tools are currently available to the super-computing community. The performance data gathered and analyzed by these tools fall under two categories: statistics and event traces. Statistical data is much more compact but lacks the probative power event traces offer. Event traces, on the other hand, can easily fill up the entire file system during execution such that the instrumented execution may have to be terminated half way through. In this paper, we propose an innovative methodology for performance data gathering and representation that offers a middle ground. The user can trade-off tracing overhead, trace data size vs. data quality incrementally. In other words, the user will be able to limit the amount of trace collected and, at the same time, carry out some of the analysis event traces offer using space-time views for the entire execution. Two basic ideas are employed: the use of averages to replace recording data for each instance and formulae to represent sequences associated with communication and control flow. With the help of a few simple examples, we illustrate the use of these techniques in performance tuning and compare the quality of the traces we collected vs. event traces. We found that the trace files thus obtained are, in deed, small, bounded and predictable before program execution and that the quality of the space time views generated from these statistical data are excellent. Furthermore, experimental results showed that the formulae proposed were able to capture 100% of all the sequences associated with 11 of the 15 applications tested. The performance of the formulae can be incrementally improved by allocating more memory at run-time to learn longer sequences.

Author

Statistical Analysis; Data Processing; Space-Time Functions; Computer Systems Performance

20070002125 SRI International Corp., Menlo Park, CA USA

Hierarchic Autoepistemic Theories for Nonmonotonic Reasoning: Preliminary Report

Konolige, Kurt; Apr 1991; 28 pp.; In English

Contract(s)/Grant(s): N00014-85-C-0251; N00039-84-C-0211

Report No.(s): AD-A458639; SRI-TR-446R; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458639>; Avail.: CASI: A03, Hardcopy

Nonmonotonic logics are meant to be a formalization of nonmonotonic reasoning. However, for the most part they fail to embody two of the most important aspects of such reasoning: the explicit computational nature of nonmonotonic inference, and the assignment of preferences among competing inferences. We propose a method of nonmonotonic reasoning in which the notion of inference from specific bodies of evidence plays a fundamental role. The formalization is based on autoepistemic logic, but introduces additional structure, a hierarchy of evidential spaces. The method offers a natural formalization of many different applications of nonmonotonic reasoning, including reasoning about action, speech acts, belief revision, and various situations involving competing defaults.

DTIC

Artificial Intelligence; Logic

20070002126 SRI International Corp., Menlo Park, CA USA
A Practical Nonmonotonic Theory for Reasoning About Speech Acts

Appelt, Douglas; Konolige, Kurt; Apr 6, 1988; 11 pp.; In English

Contract(s)/Grant(s): N00014-85-C-0251; N00039-84-C-0211

Report No.(s): AD-A458634; SRI-TN-432; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458634>; Avail.:

CASI: A03, Hardcopy

A prerequisite to a theory of the way agents understand speech acts is a theory of how their beliefs and intentions are revised as a consequence of events. This process of attitude revision is an interesting domain for the application of non-monotonic reasoning because speech acts have a conventional aspect that is readily represented by defaults, but that interacts with an agent's beliefs and intentions in many complex ways that may override the defaults. Perrault has developed a theory of speech acts, based on Rieter's default logic, that captures the conventional aspect; it does not, however, adequately account for certain easily observed facts about attitude revision resulting from speech acts. A natural theory of attitude revision seems to require a method of stating preferences among competing defaults. We present here a speech act theory, formalized in hierarchic autoepistemic logic (a refinement of Moore's autoepistemic logic), in which revision of both the speaker's and hearer's attitudes can be adequately described. As a collateral benefit, efficient automatic reasoning methods for the formalism exist. The theory has been implemented and is now being employed by an utterance-planning system.

DTIC

Speech; Formalism

20070002137 Maryland Univ., College Park, MD USA

Symbolic MT With Statistical NLP Components

Dorr, Bonnie J; Habash, Nizar Y; Monz, Christof; Jun 2004; 12 pp.; In English

Contract(s)/Grant(s): LAMP-TR-112; CAR-TR-996

Report No.(s): AD-A458796; DAAD19-03-2-0020; No Copyright; Avail.: CASI: A03, Hardcopy

This reports provides an overview of the findings and software that have evolved from the 'Symbolic MT with Statistical NLP Components' project over the last year. We present the major goals that have been achieved and discuss some of the open issues that we intend to address in the near future. This report also contains some details on the usage of some software that has been implemented during the project.

DTIC

Machine Translation; Natural Language (Computers)

20070002617 NASA Marshall Space Flight Center, Huntsville, AL, USA

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly

LeMaster, Edward A.; Schaechter, David B.; Carrington, Connie K.; [2006]; 14 pp.; In English; AIAA Space 2006 Conference, 19-21 Sep. 2006, San Jose, CA, USA; Original contains black and white illustrations

Contract(s)/Grant(s): NNM05AA99C; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002617>; Avail.: CASI:

A03, Hardcopy

The Modular Reconfigurable High Energy (MRHE) program aimed to develop technologies for the automated assembly and deployment of large-scale space structures and aggregate spacecraft. Part of the project involved creation of a terrestrial robotic testbed for validation and demonstration of these technologies and for the support of future development activities. This testbed was completed in 2005, and was thereafter used to demonstrate automated rendezvous, docking, and

self-assembly tasks between a group of three modular robotic spacecraft emulators. This paper discusses the rationale for the MRHE project, describes the testbed capabilities, and presents the MRHE assembly demonstration sequence.

Author

Autonomy; Robotics; Technology Utilization; Spacecraft Design; Aerospace Engineering; Large Space Structures

20070003015 Massachusetts Inst. of Tech., Cambridge, MA USA

Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images

Heisele, Bernd; Serre, Thomas; Mukherjee, Sayan; Poggio, Tomaso; Jan 2001; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-00-1-0907; NSF-IIS-9800032

Report No.(s): AD-A458821; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458821>; Avail.: CASI: [A02](#),

Hardcopy

We present a two-step method to speed-up object detection systems in computer vision that use Support Vector Machines (SVMs) as classifiers. In a first step we perform feature reduction by choosing relevant image features according to a measure derived from statistical learning theory. In a second step we build a hierarchy of classifiers. On the bottom level, a simple and fast classifier analyzes the whole image and rejects large parts of the background. On the top level, a slower but more accurate classifier performs the final detection. Experiments with a face detection system show that combining feature reduction with hierarchical classification leads to a speed-up by a factor of 170 with similar classification performance. criterion of the classification algorithm to select the optimal feature subset. Wrapper methods can provide more accurate solutions than filter methods [5], but in general are more computationally expensive. We present a new wrapper method to reduce the dimensions of both input and feature space of an SVM. An alternative approach for speeding-up SVM classification has been proposed in [7] by reducing the number of support vectors. Feature reduction is a generic tool that can be applied to any classification problem. When dealing with a specific classification task we can use prior knowledge about the type of data to speed-up classification.

DTIC

Classifiers; Computer Vision; Detection; Hierarchies; Pattern Recognition

20070003018 SRI International Corp., Menlo Park, CA USA

Conversation as Planned Behavior

Hobbs, Jerry R; Evans, David A; Dec 1979; 53 pp.; In English

Contract(s)/Grant(s): N00039-79-C-0118

Report No.(s): AD-A458827; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458827>; Avail.: CASI: [A04](#),

Hardcopy

Perhaps the most promising working hypothesis for the study of conversation is that the participants can be viewed as using planning mechanisms much like those developed in artificial intelligence. In this paper, a framework for investigating conversation called the 'Planning Approach' is developed from this hypothesis. It suggests a style of analysis that can be applied to conversation that includes the participants' goals, plans, and beliefs. The Planning Approach is described in detail in Part 2. Part 3 presents the fragment of conversation that is to be analyzed, and Part 4 focuses on the microanalysis of the free-flowing conversation as an illustration of the Planning Approach style of analysis. In the process, order is discovered in a conversation that on the surface seems quite incoherent. The microanalysis suggests ways in which the planning mechanisms common in artificial intelligence will have to be extended to deal with conversation. These computational mechanisms are discussed in Part 5. In Part 6, certain methodological difficulties are examined. Part 7 addresses the question of what constitutes successful communication.

DTIC

Conversation; Linguistics; Microanalysis; Natural Language (Computers); Natural Language Processing

20070003019 SRI International Corp., Menlo Park, CA USA

Metaphor, Metaphor Schemata, and Selective Inferencing

Hobbs, Jerry R; Dec 1979; 41 pp.; In English

Contract(s)/Grant(s): N00039-79-C-0118

Report No.(s): AD-A458828; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458828>; Avail.: CASI: [A03](#),

Hardcopy

This paper demonstrates the importance of spatial and other metaphors. An approach to handling metaphors in a

computational framework is described, based on the idea of selective inferencing. Three types of metaphor are examined in detail in this light: a simple metaphor, a spatial metaphor schema, and a novel metaphor. Finally, the author discusses the analogical processes that underlie the metaphor in this approach, and what the approach says about several classical questions about the metaphor.

DTIC

Linguistics; Natural Language (Computers); Natural Language Processing; Semantics

20070003029 Maryland Univ., College Park, MD USA

Compressed Video Segmentation

Kobla, Vikrant; Doermann, David; Rosenfeld, Azriel; Sep 1996; 27 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA9049-C6-1250

Report No.(s): AD-A458852; LAMP-TR-001; CFAR-TR-893; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458852>; Avail.: CASI: A03, Hardcopy

Segmentation of video into shots and scenes in the compressed domain allows rapid real-time analysis of video content using standard hardware. This paper presents robust techniques for parsing MPEG-compressed video sequences into shots based on their physical structure and further into scenes based on their semantic structure by identifying changes in content and camera motion. The analysis is performed in the compressed domain using available macroblock and motion vector information, and if necessary, discrete cosine transform (DCT) information. Motion vector analysis yields a qualitative description of the camera motion and is used to subdivide shots into subshots. Key frames for the shots and scenes can be used for browsing, indexing, and retrieval.

DTIC

Segments; Video Compression

20070003067 Stanford Research Inst., Menlo Park, CA USA

Utterance and Objective: Issues in Natural Language Communication

Grosz, Barbara J; Jun 1979; 12 pp.; In English

Contract(s)/Grant(s): N00039-79-C0118; MCS76-220004

Report No.(s): AD-A458907; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458907>; Avail.: CASI: A03,

Hardcopy

Two premises, reflected in the title underlie the perspective from which I will consider research in natural language processing in this paper. First, progress on building computer systems that process natural languages in any meaningful sense (i.e., systems that interact reasonably with people in natural language) requires considering language as part of a larger communicative situation. In this larger situation, the participants in a conversation and their states of mind are as important to the interpretation of an utterance as the linguistic expressions from which it is formed. A central concern when language is considered as communication is its function in building and using shared models of the world. Indeed, the notion of a shared model is inherent in the word 'communicate' which is derived from the Latin *communicare*, 'to make common.'

DTIC

Data Processing; Natural Language (Computers)

20070003077 SRI International Corp., Menlo Park, CA USA

Shakey the Robot

Nilsson, Nils J; Apr 1984; 135 pp.; In English

Report No.(s): AD-A458918; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458918>; Avail.: CASI: A07,

Hardcopy

From 1960 through 1972, the Artificial Intelligence Center at SRI conducted research on a mobile robot system nicknamed 'Shakey.' Endowed with a limited ability to perceive and model its environment, Shakey could perform tasks that required planning, route finding, and the rearranging of simple objects. Although the Shakey project led to numerous advances in AI techniques, many of which were reported in the literature, much specific information that might be useful in current robotics research appears only in a series of relatively inaccessible SRI technical reports. Our purpose here, consequently, is to make this material more readily available by extracting and reprinting those sections of the reports that seem particularly interesting, relevant and important.

DTIC

Artificial Intelligence; Robots

20070003078 SRI International Corp., Menlo Park, CA USA

A Deduction Model of Belief and Its Logics

Konolige, Kurt; Aug 16, 1984; 301 pp.; In English

Contract(s)/Grant(s): N00014-80-C-0296; F4920-82-K-0031

Report No.(s): AD-A458919; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458919>; Avail.: CASI: [A14](#),

Hardcopy

Reasoning about the knowledge and beliefs of computer and human agents is assuming increasing importance in artificial intelligence systems for natural language understanding, planning, and knowledge representation. A natural model of belief for robot agents is the deduction model: an agent is represented as having an initial set of beliefs about the world in some internal language and a deduction pro deriving some (but not necessarily all) logical consequences of these beliefs. Because the deduction model is an explicitly computational model, it is possible to take into account limitations of an agent's resources when reasoning. This thesis is an investigation of a Gentzen-type formalization of the deductive model of belief. Several original results are proved. Among these are soundness and completeness theorems for a deductive belief logic; a correspondence result that relates our deduction model to competing possible-world models; and a modal analog to Herbrand's Theorem for the belief logic. Specialized techniques for automatic deduction based on resolution are developed using this theorem.

DTIC

Artificial Intelligence; Natural Language (Computers)

20070003079 SRI International Corp., Menlo Park, CA USA

Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms

Sheiber, Stuart M; Karttunen, Lauri; Pereira, Fernando C N; Jun 1984; 61 pp.; In English

Contract(s)/Grant(s): N00039-80-C-0575; N00039-84-K-0078

Report No.(s): AD-A458920; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458920>; Avail.: CASI: [A04](#),

Hardcopy

This report is a compilation of papers by the PATR group in the Artificial Intelligence Center at SRI International reporting on on-going research on both practical and theoretical issues concerning grammar formalisms. The current formalism being simultaneously designed, implemented and used by the group, PATR-II, is based on unification of directed-graph structures. Unification is thus a theme both of our research, and of the papers reproduced in this volume. These papers provide an overview of the design of PATR-II (Chapter 1), a discussion of the use of disjunction and negation in unification-based feature systems (Chapter 2), and a theoretical framework for unification-based grammar formalisms which is founded on the domain-theoretic techniques of Dana Scott (Chapter 3). All three chapters are versions of papers presented at the Tenth International Conference on Computational Linguistics at Stanford University, Stanford, California during July 2 through 7, 1984.

DTIC

Formalism; Grammars; Linguistics; Natural Language Processing

20070003093 North Carolina State Univ., Raleigh, NC USA

An Image Schema Language

St Amant, Robert; Morrison, Clayton T; Chang, Yu-Han; Mu, Wei; Cohen, Paul R; Beal, Carole; Jan 2006; 7 pp.; In English;

Original contains color illustrations

Contract(s)/Grant(s): IIS-0534398

Report No.(s): AD-A458943; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458943>; Avail.: CASI: [A02](#),

Hardcopy

This paper introduces ISL, a language for representing and manipulating image schemas. ISL supports the representation of symbolic as well as quantitative dynamic properties of objects and relationships. We have encoded a number of the image schemas commonly covered in the cognitive linguistics literature and tested them in three domains: patterns in chess, tactics in military scenarios, and behavior in a simple robot arm simulation. This paper discusses the design of the language and demonstrates its representational capabilities with examples from these domains.

DTIC

Cognition; Semantics

20070003122 Air Force Research Lab., Kirkland AFB, NM USA

Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Postprint)

Matson, Charles; Haji, Aiim; Sep 1, 2006; 12 pp.; In English

Contract(s)/Grant(s): F29601-01-D-0083/0006; Proj-DOD0

Report No.(s): AD-A458988; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458988>; Avail.: CASI: [A03](#),

Hardcopy

Multi-frame blind deconvolution (MFBD) algorithms can be used to reconstruct a single high-resolution image of an object from one or more measurement frames of that are blurred and noisy realizations of that object. The blind nature of MFBD algorithms permits the reconstruction process to proceed without having separate measurements of knowledge of the blurring functions in each of the measurement frames. This is accomplished by estimating the object common to all the measurement frames jointly with the blurring functions that are different from frame to frame. An issue of key importance is understanding how accurately the object pixel intensities can be estimated with the use of MFBD algorithms. Here we present algorithm-independent lower bounds to the variances of estimates of the object pixel intensities to quantify the accuracy of these estimates when the blurring functions are estimated pixel by pixel. We employ support constraints on both object and the blurring functions to aid in making the inverse problem unique. The lower bounds are presented as a function of the sizes and shapes of these support regions and the number of measurement frames.

DTIC

Cramer-Rao Bounds; Image Reconstruction; Pixels

20070003143 Idaho Univ., Moscow, ID USA

Regulating a Formation of a Large Number of Vehicles

Okamoto, Akira; Edwards, Dean B; Jan 2005; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-03-1-0634

Report No.(s): AD-A459027; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459027>; Avail.: CASI: [A02](#),

Hardcopy

Various control algorithms have been developed for fleets of autonomous vehicles. Many of the successful control algorithms in practice are behavior-based control or nonlinear control algorithms, which makes analyzing their stability difficult. At the same time, many system theoretic approaches for controlling a fleet of vehicles have also been developed. These approaches usually use very simple vehicle models such as particles or point-mass systems and have only one coordinate system which allows stability to be proven. Since most of the practical vehicle models are six-degree-of-freedom systems defined relative to a body-fixed coordinate system, it is difficult to apply these algorithms in practice. In this paper, we consider a formation regulation problem as opposed to a formation control problem. In a formation control problem, convergence of a formation from random positions and orientations is considered, and it may need a scheme to integrate multiple moving coordinates. On the contrary, in a formation regulation problem, it is not necessary since small perturbations from the nominal condition, in which the vehicles are in formation, are considered. A common origin is also not necessary if the relative distance to neighbors or a leader is used for regulation. Under these circumstances, the system theoretic control algorithms are applicable to a formation regulation problem where the vehicle models have six degrees of freedom. We will use a realistic six-degree-of-freedom model and investigate stability of a fleet using results from decentralized control theory. We will show that the leader-follower control algorithm does not have any unstable fixed modes if the followers are able to measure distance to the leader. We also show that the leader-follower control algorithm has fixed modes at the origin, indicating that the formation is marginally stable, when the relative distance measurements are not available.

DTIC

Algorithms; Control Theory; Underwater Vehicles

20070003156 Wyoming Univ., Laramie, WY USA

Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PREPRINT)

McInroy, John E; Erwin, R S; Robertson, Lawrence M; Nov 2006; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459047; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459047>; Avail.: CASI: [A03](#),

Hardcopy

Determining the rigid transformation relating a 2d image to known geometry is a classical problem in computer vision. To date, the most accurate methods require performing an unknown number of iterations until a numerical algorithm converges to the desired tolerance. For the case of affine imaging, this paper replaces these nonlinear numerical iterations with solving the standard 3d-3d optimal orientation problem $2(n)$ times, where n is the number of data points. The $2(n)$ successive optimal orientation calculations are speeded through use of Gray code, and have the dual advantages of speed and predictable

execution time. Angular errors caused by scaling imperfections are quantified, and a least upper bound estimate of the scaling is proposed. It is shown that the worst case viewpoints depend only on the data points chosen, and a new convex linear matrix inequality optimization is derived for determining the worst viewpoint. This new analysis tool is useful for evaluating a particular set of data and suggests methods of designing the data for high performance.

DTIC

Estimating; Pattern Recognition

20070003181 Washington Univ., Seattle, WA USA

Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation

Poovendran, Radha; Matt, Brian; Jan 2005; 18 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0242; N00014-04-1-0479

Report No.(s): AD-A459087; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459087>; Avail.: CASI: A03,

Hardcopy

Broadcast is the inherent mode of communication in wireless networks that deploy omnidirectional antennas. In broadcast mode, all members who are within the communication range of the transmitting node can receive the message, thus making it resource-efficient for the sender as well as the network. However, in many applications the set of users that have access to the communication must be restricted. The use of cryptography is one way to restrict the set of members who can access the communication. When the amount of data is high, the use of symmetric keys will help reduce the computational overhead due to the encryption and decryption. However, the use of symmetric keys require that all members share the same keys for decryption. Several methods have been proposed to generate and distribute a single common key to all the members of a communicating group. Among these methods is the distributed key generation method proposed by Poovendran, Corson and Baras in [PCB], which we call the PCB scheme in this paper. The PCB scheme made use of modulo arithmetic and generalized the property of one-time pad, proposed by Shannon. However, as of now there is no analysis on the security properties of the PCB method. In this work we enhance the original PCB algorithm and present the security analysis based on information theoretic techniques. We also show how to develop a computationally efficient algorithm for computing the PCB keys. The organization of the chapter is as follows: we first review the one-time pad and its properties using probabilistic as well as information theoretic approaches. We then present the PCB algorithm. We provide detailed analysis of the PCB algorithm using probabilistic as well as information theoretic techniques. We also show how to develop computationally efficient techniques that will enable efficient calculation of the group's shared key.

DTIC

Algorithms; Cryptography; Decoding; Information Theory; Polychlorinated Biphenyls; Security

20070003186 Nebraska Univ., Lincoln, NE USA

Parallel Randomized State-Space Search

Dwyer, Matthew B; Elbaum, Sebastian; Person, Suzette; Purandare, Rahul; Jan 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0104

Report No.(s): AD-A459092; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459092>; Avail.: CASI: A03,

Hardcopy

Model checkers search the space of possible program behaviors to detect errors and to demonstrate their absence. Despite major advances in reduction and optimization techniques, state-space search can still become cost-prohibitive as program size and complexity increase. In this paper, we present a technique for dramatically improving the cost effectiveness of state-space search techniques for error detection using parallelism. Our approach can be composed with all of the reduction and optimization techniques we are aware of to amplify their benefits. It was developed based on insights gained from performing a large empirical study of the cost-effectiveness of randomization techniques in state-space analysis. We explain those insights and our technique, and then show through a focused empirical study that our technique speeds up analysis by factors ranging from 2 to over 1000 as compared to traditional modes of state-space search, and does so with relatively small numbers of parallel processors.

DTIC

Artificial Intelligence; Cost Effectiveness; Cost Reduction; Program Verification (Computers)

20070003230 University of Southern California, Marina del Rey, CA USA

Toward the Holodeck: Integrating Graphics, Sound, Character and Story

Swartout, W; Hill, R; Gratch, J; Johnson, W L; Kyriakakis, C; LaBore, C; Lindheim, R; Marsella, S; Miraglia, D; Moore, B; Jan 2006; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-C-0046

Report No.(s): AD-A459186; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459186>; Avail.: CASI: **A02**, Hardcopy

We describe an initial prototype of a holodeck-like environment that we have created for the Mission Rehearsal Exercise Project. The goal of the project is to create an experience learning system where the participants are immersed in an environment where they can encounter the sights, sounds, and circumstances of realworld scenarios. Virtual humans act as characters and coaches in an interactive story with pedagogical goals.

DTIC

Computerized Simulation; Environment Simulators; Holography; Physical Exercise; Virtual Reality

20070003253 Maryland Univ., College Park, MD USA

A Survey of Spatio-Temporal Grouping Techniques

Megret, Remi; DeMenthon, Daniel; Aug 2002; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA9049-6C-1250

Report No.(s): AD-A459242; LAMP-094; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459242>; Avail.: CASI: **A03**, Hardcopy

Spatio-temporal segmentation video sequences attempts to extract backgrounds and independent objects in the dynamic scenes captured in the sequences. It is an essential step of video analysis. It has important applications in video coding, video logging, indexing and retrieval, and more generally in scene interpretation and video understanding. We classify spatio-temporal grouping techniques into three categories: (1) segmentation with spatial priority, (2) segmentation by trajectory grouping, and (3) joint spatial and temporal segmentation. The first category is the broadest, as it inherits the legacy techniques of image segmentation and motion segmentation. The other two categories place a higher priority on the accumulation of evidence along the temporal dimension and are more recent developments made feasible by the increased availability of computing power. For each category we provide a taxonomy of the techniques used to produce meaningful pixel groupings.

DTIC

Image Processing; Pattern Recognition; Sequencing; Surveys

20070003265 Boston Univ., Boston, MA USA

Foundations of Automatic Target Recognition

Karl, W C; Aug 31, 2006; 6 pp.; In English

Contract(s)/Grant(s): F49620-03-1-0257

Report No.(s): AD-A459255; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459255>; Avail.: CASI: **A02**, Hardcopy

This report summarizes the results on this project for developing approaches for feature enhanced and object-based image reconstruction and processing. Object-based methods for tasks such as segmentation and localization were developed. These tools were applied to problems such as segmentation of LIDAR. Object-based methods for dynamic tomography are also being developed together with prior models of object shape. New, real time algorithms for contour-based segmentation were developed. Preliminary examples have indicated the superior performance of these methods in challenging imaging environments.

DTIC

Image Processing; Shapes; Target Recognition

20070003279 Army Research Lab., Adelphi, MD USA

Shaped-Based Recognition of 3D Objects From 2D Projections

David, Philip; DeMenthon, Daniel; Dec 2006; 40 pp.; In English

Report No.(s): AD-A459273; ARL-TR-4006; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459273>; Avail.: CASI: **A03**, Hardcopy

We present an object recognition algorithm that uses model and image line features to locate complex objects in high

clutter environments. Corresponding line features are determined by a three-stage process. The first stage generates a large number of approximate pose hypotheses from correspondence of one or two lines in the model and image. Next, pose hypotheses from the previous stage are quickly evaluated and ranked by a comparison of local image neighborhoods to the corresponding local model neighborhoods. Fast nearest neighbor and range search algorithms are used to implement a distance measure that is unaffected by clutter and partial occlusion. The ranking of pose hypotheses is invariant to changes in image scale, orientation, and partially invariant to affine distortion. Finally, a robust pose estimation algorithm is applied for refinement and verification, starting from the few best approximate poses produced by the previous stages. Experiments on real images demonstrate robust recognition of partially occluded objects in very high clutter environments.

DTIC

Algorithms; Clutter; Pattern Recognition

20070003293 Massachusetts Inst. of Tech., Cambridge, MA USA

Multiscale Object Recognition and Feature Extraction Using Wavelet Networks

Jaggi, Seema; Karl, W C; Krim, Hamid; Willisky, Alan S; Mar 1995; 19 pp.; In English

Contract(s)/Grant(s): F49620-93-1-0604; DAAL03-92-G-0115

Report No.(s): AD-A459290; LIDS-P-2295; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459290>; Avail.: Defense Technical Information Center (DTIC)

In this work we present a novel method of object recognition and feature generation based on multiscale object descriptions obtained using wavelet networks in combination with morphological filtering. First morphological filtering techniques are used to obtain structural information about the object. Then, wavelet networks are used to extract or capture geometric information about an object at a series of scales. A wavelet network is of the form of a 1-1/2 layer neural network with the sigmoid functions replaced by wavelet functions. Like neural networks, wavelet networks are universal approximators. In contrast to neural networks, the initialization of a wavelet network follows directly from a commonly known transformation namely, the discrete dyadic wavelet decomposition. In contrast to a dyadic wavelet decomposition, the wavelet parameters are then allowed to vary to fit the data. Although developed in the context of function approximation, wavelet networks naturally fit in this object recognition framework because of the geometric nature of the network parameters (i.e. translations, rotations, and dilations). Wavelet networks are the basis for a hierarchical object recognition scheme where the wavelet network representation of the object at each scale is a feature vector which may be used to classify the object. At coarse scales, the feature vector is used to narrow the field of possible objects and to yield pose information. This information may also be used to generate candidate matches between the data and more detailed object models. The wavelet network representation at finer scales is then used to identify the object from this reduced space of possible objects. In keeping with our proposed integrated approach to ATD/R we demonstrate how wavelet networks may be applied to anomaly suppression in laser range images by fitting a multiresolution wavelet basis to the data in conjunction with the expectation-maximization (EM) algorithm.

DTIC

Neural Nets; Pattern Recognition; Wavelet Analysis

20070003326 University of Southern California, Marina del Rey, CA USA

On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT

Vakebte, Andre; Blythe, Jim; Gil, Yolanda; Swartout, William; Jan 1999; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DABT63-95-C-0059; F300602-97-C-0118

Report No.(s): AD-A459370; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459370>; Avail.: CASI: [A02](#), Hardcopy

In this paper, we use the example of a successful mixed initiative plan evaluation tool for the domain of air campaign planning to argue that the human-in-the-loop is an important feature of enterprise control systems. Our tool, called INSPECT, evaluates air campaign plans and alerts the user about inconsistencies and potential problems. A generalization of INSPECT called PSMTool is also capable of limited interaction with a subject matter expert to capture new critiques of plans. The paper describes our work on INSPECT and PSMTool, analyzes the key contributions of these tools, and draws some conclusions about the role of mixed-initiative tools in enterprise control systems.

DTIC

Artificial Intelligence; Knowledge Based Systems

20070003330 University of Southern California, Marina del Rey, CA USA

Knowledge Acquisition using an English-Based Method Editor

Blythe, Jim; Ramachandran, Surya; Jan 1999; 14 pp.; In English

Contract(s)/Grant(s): DABT63-95-C-0059; F30602-97-1-0195

Report No.(s): AD-A459377; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459377>; Avail.: CASI: [A03](#),
Hardcopy

We describe an editor for problem-solving knowledge that communicates with the user through English paraphrases of the knowledge. Although it does not support the full range of modifications one might want to make, the value of the tool lies in the fact that the user need not understand the syntax of the expert system to make modifications. By analyzing the problem solving knowledge, the tool can allow the user to select semantically coherent chunks of the knowledge. It then presents English paraphrases of possible substitutions which would result in new problem-solving knowledge that is syntactically correct. In this way the tool expands the range of modifications that a naive user can make to problem-solving knowledge in an expert system.

DTIC

Knowledge Based Systems; Syntax

64

NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20070002118 Army Engineer Research and Development Center, Vicksburg, MS USA

CHL Precision Flow Table - Description and Applications

Hughes, Steven A; Mar 2003; 13 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458565; ERDC/CHL-CHETN-IV-55; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458565>;
Avail.: CASI: [A03](#), Hardcopy

The Coastal and Hydraulics Engineering Technical Note (CHETN) described herein provides information about the new precision flow table experiment facility located at the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory (CHL). The precision flow table can examine complex steady flow problems rapidly and at low cost. This capability is useful for understanding complicated flow problems and deciding on whether to pursue more elaborate modeling technologies. A description of the flow table capabilities is given along with an example application related to flow at a tidal estuary.

DTIC

Fluid Flow; Hydraulic Analogies

20070003009 Maryland Univ., College Park, MD USA

Rotation Prevents Finite-Time Breakdown

Liu, Hailiang; Tadmor, Eitan; Jul 24, 2003; 18 pp.; In English

Contract(s)/Grant(s): N00014-91-J-1076; DMS01-07917

Report No.(s): AD-A458028; CSCAMM-03-04; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458028>; Avail.:
CASI: [A03](#), Hardcopy

We consider a two-dimensional model augmented with the rotational Coriolis forcing, with a fixed $2k$ being the inverse Rossby number. We ask whether the action of dispersive rotational forcing alone, prevents the generic finite time breakdown of the free nonlinear convection. The answer provided in this work is a conditional yes. Namely, we show that the rotating Euler equations admit global smooth solutions for a subset of generic initial configurations. With other configurations, however, finite time breakdown of solutions may and actually does occur. Thus, global regularity depends on whether the initial configuration crosses an intrinsic, $O(1)$ critical threshold, which is quantified in terms of the initial vorticity, and the initial spectral gap associated with the 2×2 initial velocity gradient. Specifically, global regularity of the rotational Euler equation is ensured if and only if. We also prove that the velocity field remains smooth if and only if it is periodic. An equivalent Lagrangian formulation reconfirms the critical threshold and shows a global periodicity of velocity field as well as the associated particle orbits. Moreover, we observe yet another remarkable periodic behavior exhibited by the gradient of the velocity field. The spectral dynamics of the Eulerian formulation, reveals that the vorticity and the divergence of the flow

evolve with their own path-dependent period. We conclude with a kinetic formulation of the Euler equation.

DTIC

Convection; Nonlinear Systems; Rotation

20070003014 Washington Univ., Seattle, WA USA

Bayesian Multidimensional Scaling and Choice of Dimension

Oh, Man-Suk; Raftery, Adrian E; Aug 2000; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-96-1-1092

Report No.(s): AD-A458817; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458817>; Avail.: CASI: A03, Hardcopy

Multidimensional scaling is widely used to handle data which consist of dissimilarity measures between pairs of objects or people. We deal with two major problems in metric multidimensional scaling--configuration of objects and determination of the dimension of object configuration--within a Bayesian framework. A Markov chain Monte Carlo algorithm is proposed for object configuration, along with a simple Bayesian criterion for choosing their effective dimension, called MDSIC. Simulation results are presented, as well as examples on real data. Our method provides better results than classical multidimensional scaling for object configuration, and MDSIC seems to work well for dimension choice in the examples considered.

DTIC

Bayes Theorem; Pulse Rate; Scalers; Selection

20070003024 California Univ., Santa Barbara, CA USA

The Nyquist Stability Criterion for a Class of Spatially Periodic Systems

Fardad, Makan; Bamieh, Bassam; Jan 2005; 7 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0207; ECS-0323814

Report No.(s): AD-A458843; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458843>; Avail.: CASI: A02, Hardcopy

The Nyquist stability criterion is extended to a class of spatially periodic systems with spatially distributed inputs and outputs. It is demonstrated that the exponential stability of this class of systems can be guaranteed by checking the Nyquist stability criterion for a family of finite-dimensional systems. In order to show this result, a new version of the argument principle is derived that is applicable to systems with infinite-dimensional input/output spaces and unbounded system operators.

DTIC

Criteria; Spatial Distribution; Stability

20070003032 California Univ., Santa Barbara, CA USA

Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems

Fardad, Makan; Bamieh, Bassam; Jan 16, 2006; 21 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0207

Report No.(s): AD-A458858; CCDC-06-0116; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458858>; Avail.: CASI: A03, Hardcopy

We consider systems governed by partial differential equations with spatially periodic coefficients over unbounded domains. These spatially periodic systems are considered as perturbations of spatially invariant ones, and we develop perturbation methods to study their stability and H₂ system norm. The operator Lyapunov equations characterizing the H₂ norm are studied using a special frequency representation, and formulae are given for the perturbation expansion of their solution. The structure of these equations allows for a recursive method for solving for the expansion terms. Our analysis provides conditions that capture possible resonances between the periodic coefficients and the spatially invariant part of the system. These conditions can be regarded as useful guidelines when spatially periodic coefficients are to be designed to increase/decrease the H₂ norm of a spatially distributed system. The developed perturbation framework also gives simple conditions for checking exponential stability.

DTIC

Partial Differential Equations; Perturbation; Stability Tests

20070003033 California Univ., Santa Barbara, CA USA

On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems

Fardad, Makan; Bamieh, Bassam; Jan 2005; 8 pp.; In English

Contract(s)/Grant(s): FA9550-04-1-0207

Report No.(s): AD-A458859; CCDC-05-1125; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458859>; Avail.:

CASI: [A02](#), Hardcopy

We consider distributed parameter systems where the underlying dynamics are spatially periodic on the real line. We examine the problem of exponential stability, namely whether the semigroup $e(At)$ decays exponentially in time. It is known that for distributed systems the condition that the spectrum of A belongs to the open left-half plane is, in general, not sufficient for exponential stability. Those systems for which this condition is sufficient are said to satisfy the Spectrum Determined Growth Condition (SDGC). In this work we separate A into a spatially invariant operator and a spatially periodic operator. We find conditions for the spatially invariant part to satisfy the SDGC. We then show that the SDGC remains satisfied under the addition of the spatially periodic operator, if this operator is small enough relative to the spatially invariant one. A similar method is used to derive conditions which guarantee that A has left-half plane spectrum, and thus the system is exponentially stable. The results are demonstrated through simple illustrative examples.

DTIC

Exponential Functions; Periodic Variations; Spectra; Stability

20070003059 Brown Univ., Providence, RI USA

Numerical Approximations for Non-Zero-Sum Stochastic Differential Games

Kushner, Harold J; Dec 10, 2005; 36 pp.; In English

Contract(s)/Grant(s): DMS-0506928; W911NF-05-10928

Report No.(s): AD-A458895; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458895>; Avail.:

CASI: [A03](#),
Hardcopy

The Markov chain approximation method is a widely used, and efficient family of methods for the numerical solution a large part of stochastic control problems in continuous time for reflected-jump-diffusion-type models. It converges under broad conditions, and there are good algorithms for solving the numerical approximations if the dimension is not too high. It has been extended to zero-sum stochastic differential games. We apply the method to consider a class of non-zero stochastic differential games with a diffusion system model where the controls for the two players are separated in the dynamics and cost function. There have been successful applications of the algorithms, but convergence proofs have been lacking. It is shown that equilibrium values for the approximating chain converge to equilibrium values for the original process and that any equilibrium value for the original process can be approximated by an epsilon-equilibrium for the chain for arbitrarily small epsilon ≥ 0 . The numerical method solves a stochastic game for a finite-state Markov chain.

DTIC

Approximation; Differential Games; Game Theory; Stochastic Processes

20070003064 Yale Univ., New Haven, CT USA

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators

Tygart, Mark; Dec 7, 2005; 3 pp.; In English

Report No.(s): AD-A458901; YALEU/DCS/RR-1339; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458901>;

Avail.:

CASI: [A01](#), Hardcopy

We cite techniques that immediately yield theoretically efficient algorithms for computing solutions to eigenfunction problems for self-adjoint linear differential operators of any finite order acting on real-valued functions on the interval; these algorithms incur computational costs that are nearly optimally small, to within factors that are constant multiples of small powers of the logarithm of the problem size. However, the factors in the computational costs are in general too large for practical applications; the algorithms would appear to require careful, detailed optimizations for each particular application in order to be useful in practice.

DTIC

Algorithms; Differential Equations; Eigenvectors; Linear Operators; Operators (Mathematics); Problem Solving

20070003081 Brown Univ., Providence, RI USA

Numerical Approximations for Stochastic Systems With Delays in the State and Control

Kushner, Harold J; Dec 26, 2005; 37 pp.; In English

Contract(s)/Grant(s): DMS-0506928; W911NF-05-10928

Report No.(s): AD-A458922; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458922>; Avail.: CASI: [A03](#), Hardcopy

The Markov chain approximation numerical methods are widely used to compute optimal value functions and controls for stochastic as well as deterministic systems. We extend them to controlled general nonlinear delayed reflected diffusion models. The path, control, and reflection terms can all be delayed. Previous work developed numerical approximations and convergence theorems. But when the control and reflection terms are delayed those and all other current algorithms normally lead to impossible demands on memory. An alternative dual approach was proposed by Kwong and Vintner for the linear deterministic system with a quadratic cost function. We extend the approach to the general nonlinear stochastic system, develop the Markov chain approximations and numerical algorithms, and prove the convergence theorems. The approach reduces the memory requirement significantly. For the no-delay case, the method covers virtually all models of current interest. The method is robust and the approximations have physical interpretations as control problems closely related to the original one. These advantages carry over to the delay problem.

DTIC

Approximation; Stochastic Processes

20070003084 Yale Univ., New Haven, CT USA

A Randomized Algorithm for the Approximation of Matrices

Martinsson, Per-Gunnar; Rokhlin, Vladimir; Tygert, Mark; Jun 7, 2006; 31 pp.; In English

Contract(s)/Grant(s): F49620-03-C-0031

Report No.(s): AD-A458927; YALEU/DCS/TR-1352; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458927>; Avail.: CASI: [A03](#), Hardcopy

Given an $m \times n$ matrix A and a positive integer k , we introduce a randomized procedure for the approximation of A with a matrix B of rank k . The procedure relies on applying $A(T)$ to a collection of l random vectors, where l is an integer equal to or slightly greater than k ; the scheme is efficient whenever A and $A(T)$ can be applied rapidly to arbitrary vectors. The discrepancy $\|B - A\|$ is of the same order as the $(k + 1)$ st greatest singular value σ_{k+1} of A , with negligible probability of even moderately large deviations. The actual estimates derived in the paper are fairly complicated, but simplify when $l - k$ is fixed at a small nonnegative integer. For example, according to one of our estimates for $l - k = 20$, the probability that $\|B - A\|$ is greater than $10 \sqrt{k + 20} \sigma_{k+1}$ is less than 10^{-17} . The paper contains a number of estimates for $\|B - A\|$, including several that are stronger (but more detailed) than the preceding example. The scheme provides a simple, efficient means for constructing an accurate approximation to the Singular Value Decomposition of A , and operates reliably independently of the structure of the matrix A . The results are illustrated via several numerical examples.

DTIC

Algorithms; Approximation; Matrices (Mathematics)

20070003087 Yale Univ., New Haven, CT USA

A Randomized Algorithm for the Approximation of Matrices

Martinsson, Per-Gunnar; Rokhlin, Vladimir; Tygert, Mark; Jun 29, 2006; 34 pp.; In English

Contract(s)/Grant(s): F49620-03-C-0031; HR0011-05-1-0002

Report No.(s): AD-A458932; YALEU/DCS/TR-1361; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458932>; Avail.: CASI: [A03](#), Hardcopy

Given an $m \times n$ matrix A and a positive integer k , we introduce a randomized procedure for the approximation of A with a matrix Z of rank k . The procedure relies on applying $A(\exp T)$ to a collection of l random vectors, where l is an integer equal to or slightly greater than k ; the scheme is efficient whenever A and $A(\exp T)$ can be applied rapidly to arbitrary vectors. The discrepancy between A and Z is of the same order as the $(k+1)$ st greatest singular value σ_{k+1} of A , with negligible probability of even moderately large deviations. The actual estimates derived in the paper are fairly complicated, but are simpler when $l - k$ is a fixed small nonnegative integer. For example, according to one of our estimates for $l - k = 20$, the probability that the spectral norm $\|A - Z\|$ is greater than $10 \sqrt{k + 20} \sigma_{k+1}$ is less than $10 \exp(-17)$. The paper contains a number of estimates for $\|A - Z\|$, including several that are stronger (but more detailed) than the preceding example; some of the estimates are effectively independent of m . Thus, given a matrix A of limited numerical rank, such that both A and AT can be applied rapidly to arbitrary vectors, the scheme provides a simple, efficient means for constructing an accurate

approximation to a Singular Value Decomposition of A . Furthermore, the algorithm presented here operates reliably independently of the structure of the matrix A . The results are illustrated via several numerical examples.

DTIC

Algorithms; Approximation; Matrices (Mathematics); Numerical Analysis; Random Variables; Statistical Analysis

20070003097 Brown Univ., Providence, RI USA

An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws

Borges, Rafael; Costa, Bruno; Don, Wai S; Jun 23, 2006; 16 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0123

Report No.(s): AD-A458949; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458949>; Avail.: CASI: A03, Hardcopy

We develop in this article an improved version of the fifth-order weighted essentially non-oscillatory (WENO) scheme. Through the novel use of higher order information already present in the framework of the classical scheme, new smoothness indicators are devised and we obtain a new WENO scheme with less dissipation than the classical WENO of Jiang and Shu, with the same computational cost, and a slightly better performance than the improved mapped version of Henrick et al. We show that the enhancements of the new scheme come from its ability to assign substantially larger weights to discontinuous stencils than the previous versions of WENO. Numerical experiments with the linear advection of discontinuous functions and the one-dimensional Euler system of equations are conducted to demonstrate the benefit of using this improved version of the WENO scheme for hyperbolic conservation laws.

DTIC

Conservation Laws; Differential Geometry; Essentially Non-Oscillatory Schemes; Oscillations; Weighting Functions

20070003099 Brown Univ., Providence, RI USA

Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems

Dupuis, Paul; Zhang, Jim X; May 12, 2006; 46 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0425; W911NF-05-1-0286

Report No.(s): AD-A458951; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458951>; Avail.: CASI: A03, Hardcopy

To exploit large deviation approximations for allocation and occupancy problems one must solve a deterministic optimal control problem (or equivalently, a calculus of variations problem). As this paper demonstrates, and in sharp contrast to the great majority of large deviation problems for processes with state dependence, for allocation problems one can construct more-or-less explicit solutions. Two classes of allocation problems are studied. The first class considers objects of a single type with a parameterized family of placement probabilities. The second class considers only equally likely placement probabilities, but allows for more than one type of object. In both cases, we identify the Hamilton-Jacobi-Bellman equation whose solution characterizes the minimal cost, explicitly construct solutions, and identify the minimizing trajectories. The explicit construction is possible because of the very tractable properties of the relative entropy function with respect to optimization.

DTIC

Allocations; Differential Equations; Nonlinear Equations; Nonlinearity; Partial Differential Equations; Problem Solving

20070003100 Brown Univ., Providence, RI USA

Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Examples and Numerics

Dupuis, Paul; Wang, Hui; Aug 8, 2005; 44 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0425

Report No.(s): AD-A458952; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458952>; Avail.: CASI: A03, Hardcopy

It has been established that importance sampling algorithms for estimating rare-event probabilities are intimately connected with two-person zero-sum differential games and the associated Isaacs equation. The purpose of the present paper and a companion paper is to show that the classical sense subsolutions of the Isaacs equation can be used as a basic and flexible tool for the construction and analysis of efficient importance sampling schemes. The importance sampling algorithms based on subsolutions are dynamic in the sense that during the course of a single simulation, the change of measure used at each time step may depend on the outcome of the simulation up until that time. While focused on theoretical aspects, the present

paper discusses explicit methods of constructing subsolutions, implementation issues, and simulation results.
DTIC

Partial Differential Equations; Sampling

20070003101 Brown Univ., Providence, RI USA

Refined Large Deviation Asymptotics for the Classical Occupancy Problem

Dupuis, Paul; Zhang, Jim X; Whiting, Philip; Jan 10, 2005; 36 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0425

Report No.(s): AD-A458953; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458953>; Avail.: CASI: A03, Hardcopy

In this paper, refined large deviation asymptotics are derived for the classical occupancy problem. The asymptotics are established for a sequential filling experiment and an occupancy experiment. In the first case, the random variable of interest is the number of balls required to fill a given fraction of the urns, while in the second a fixed number of balls are thrown and random variable is the fraction of nonempty urns.

DTIC

Asymptotic Series; Refining

20070003102 Pennsylvania State Univ., University Park, PA USA

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant

Xu, Zhengfu; Shu, Chi-Wang; Jan 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0291

Report No.(s): AD-A458954; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458954>; Avail.: CASI: A03, Hardcopy

In this paper, we further explore and apply our recent anti-diffusive flux corrected high order finite difference WENO schemes for conservation laws to compute the Saint-Venant system of shallow water equations with pollutant propagation, which is described by a transport equation. The motivation is that the high order anti-diffusive high order WENO scheme to the Saint-Venant system of shallow water equations with transport of pollutant achieves high resolution of the location and concentration of the pollutant.

DTIC

Contaminants; Difference Equations; Diffusivity; Essentially Non-Oscillatory Schemes; Finite Difference Theory; Oscillations; Shallow Water; Weighting Functions

20070003103 Brown Univ., Providence, RI USA

Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps

Qiu, Jing-Mei; Shu, Chi-Wang; Jan 2006; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0291

Report No.(s): AD-A458955; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458955>; Avail.: CASI: A03, Hardcopy

In this paper, we consider convergence of classical high order Godunov-type schemes towards entropy solutions for scalar conservation laws. It is well known that sufficient conditions for such convergence include total variation boundedness of the reconstruction and cell or wavewise entropy inequalities. We prove that under large time steps, we only need total variation boundedness of the reconstruction to guarantee such convergence. We discuss high order total variation bounded reconstructions to fulfill this sufficient condition and provide numerical examples on one dimensional convex conservation laws to assess the performance of such large time step Godunov-type methods. To demonstrate the generality of this approach, we also prove convergence and give numerical examples for a large time step Godunov-like scheme involving Sanders third order total variation diminishing reconstruction using both cell averages and point values at cell boundaries.

DTIC

Conservation Laws; Convergence; Differential Geometry; Scalars

20070003104 China Scientific and Technical Univ., Hefei, China

Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship

Lu, Yadong; Wong, S C; Zhang, Mengping; Shu, Chi-Wang; Chen, Wenqin; Jan 2006; 44 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0291

Report No.(s): AD-A458956; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458956>; Avail.: Defense Technical Information Center (DTIC)

In this paper, we explicitly construct the entropy solutions for the Lighthill-Whitham-Richards (LWR) traffic flow model with a flow-density relationship which is piecewise quadratic, continuous, concave, but not differentiable at the junction points where two quadratic polynomials meet, and with piecewise linear initial condition and piecewise constant boundary conditions. As observed traffic flow data can be well fitted with such continuous piecewise quadratic functions, the explicitly constructed solutions provide a fast and accurate solution tool which may be used for predicting traffic or as a diagnosing tool to test the performance of numerical schemes. We implement these explicit entropy solutions for three representative traffic flow cases and also compare them with numerical solutions obtained by a high order weighted essentially non-oscillatory (WENO) scheme.

DTIC

Construction; Entropy; Flow; Traffic

20070003117 Brown Univ., Providence, RI USA

Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations

Wan, Xiaoliang; Karniadakis, George E; Nov 23, 2005; 26 pp.; In English

Report No.(s): AD-A458983; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458983>; Avail.: CASI: A03, Hardcopy

In this paper we focus on the long-term behavior of generalized polynomial chaos (gPC) and multi-element generalized polynomial chaos (ME-gPC) for partial differential equations with stochastic coefficients. First, we consider the one-dimensional advection equation with a uniform random transport velocity and derive error estimates for gPC and ME-gPC discretizations. Subsequently, we extend these results to other random distributions and high-dimensional random inputs with numerical verification using the algebraic convergence rate of ME-gPC. Finally, we apply our results to noisy flow past a stationary circular cylinder. Simulation results demonstrate that ME-gPC is effective in improving the accuracy of gPC for a long-term integration whereas high-order gPC cannot capture the correct asymptotic behavior.

DTIC

Chaos; Flow; Polynomials; Simulation; Stochastic Processes

20070003127 SRI International Corp., Menlo Park, CA USA

The Logical Foundations of Evidential Reasoning (revised)

Ruspini, Enrique H; Apr 27, 1987; 38 pp.; In English

Contract(s)/Grant(s): DAAL02-85-C-0082

Report No.(s): AD-A458995; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458995>; Avail.: CASI: A03, Hardcopy

The approach proposed by Carnap for the development of logical bases for probability theory is investigated by using formal structures that are based on epistemic logic. Epistemic logic are modal logic introduced to deal with issues that are relevant to the state of knowledge that rational agents have about the real world. The use of epistemic logic in problems of analysis of evidence is justified by the need to distinguish among such notions as the state of a real system, the state of knowledge possessed by rational agents, and the impact of information on that knowledge. Carnap's method for generating a universe of possible worlds is followed using an enhanced notion of possible world that encompasses descriptions of knowledge states. Within such generalized or epistemic universes, several classes of sets are identified in terms of the truth-values of propositions that describe either the state of the world or the state of knowledge about it. These classes of subsets have the structure of a sigma algebra. Probabilities defined over one of these sigma algebras, called the epistemic algebra, are then shown to have the properties of the belief and basic probability assignment functions of the Dempster-Shafer calculus of evidence. It also is shown that any extensions of a probability function defined on the epistemic algebra (representing different states of knowledge) to the truth algebra (representing true states of the real world) must satisfy the interval probability bounds derived from the Dempster-Shafer theory. These bounds also are shown to correspond to the classical notions of lower and upper probability. Furthermore, these constraints are shown to be the best possible bounds, given

a specific state of knowledge. Finally, the problem of combining the knowledge that several agents have about a real-world system is addressed.

DTIC

Algebra; Knowledge Based Systems; Mathematical Logic; Probability Theory

20070003130 Air Force Research Lab., Kirkland AFB, NM USA

Parallelization of a Blind Deconvolution Algorithm (Postprint)

Matson, Charles L; Borelli, Kathy J; Sep 1, 2006; 10 pp.; In English

Contract(s)/Grant(s): F29601-01-D-0083; Proj-2304

Report No.(s): AD-A459007; AFRL-DE-PS-TP-2006-1019; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459007>; Avail.: CASI: A02, Hardcopy

Often it is of interest to deblur imagery in order to obtain higher-resolution images. Deblurring requires knowledge of the blurring function - information that is often not available separately from the blurred imagery. Blind deconvolution algorithms overcome this problem by jointly estimating both the high-resolution image and the blurring function from the blurred imagery. Because blind deconvolution algorithms are iterative in nature, they can take minutes to days to deblur an image depending on how many frames of data are used for the deblurring and the platforms on which the algorithms are executed. Here we present our progress in parallelizing a blind deconvolution algorithm to increase its executions speed. This progress includes sub-frame parallelization and a code structure that is not specialized to a specific computer hardware architecture.

DTIC

Algorithms; Parallel Processing (Computers)

20070003149 Colorado Univ., Denver, CO USA

Three-Dimensional Finite-Volume ELLAM Implementation

Heberton, C I; Russell, T F; Konikow, L F; Hornberger, G Z; Jan 2006; 9 pp.; In English

Contract(s)/Grant(s): DMS-9706866

Report No.(s): AD-A459035; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459035>; Avail.: CASI: A02,

Hardcopy

A three-dimensional finite-volume Eulerian-Lagrangian Localized Adjoint Method (ELLAM) has been developed, tested, and successfully implemented as part of the U.S. Geological Survey (USGS) MODFLOW/MOC3D ground-water modeling package. The USGS ELLAM code simulates solute transport in ground water for a single dissolved constituent subject to advective transport, hydrodynamic dispersion (including mechanical dispersion and diffusion), mixing from fluid sources, and simple chemical reactions (including linear sorption and decay). The implementation conserves mass locally and globally. This ELLAM algorithm incorporates an implicit-in-time, finite-difference approximation for the dispersive and source/sink terms, allowing large transport time increments to be used for greater efficiency. It uses a forward tracking approach to move mass to the new time level, distributing mass among destination cells using approximate characteristic functions. Numerous test cases indicate that the method can usually yield excellent results, even if relatively few transport time steps are used, although the quality of the results is problem dependent.

DTIC

Differential Equations; Finite Volume Method; Lagrangian Function

20070003163 University of Southern California, Los Angeles, CA USA

Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments

Peterson, J M; Kyriakakis, Chris; Jan 2006; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-99-D-0046; EEC-9529152

Report No.(s): AD-A459061; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459061>; Avail.: CASI: A01,

Hardcopy

The location of an acoustical source can be found robustly using the Steered Response Pattern - Phase Transform (SRP-PHAT) algorithm. However SRP-PHAT can be computationally expensive, requiring a search of a large number of candidate locations. The required spacing between these locations is dependent on sampling rate, microphone array geometry, and source location. In this work, a novel method will be presented that calculates a smaller number of test points using an efficient closed-form localization algorithm. This method significantly reduces the number of calculations, while still remaining robust in acoustical environments.

DTIC

Algorithms; Position (Location); Real Time Operation

20070003170 University of Southern California, Los Angeles, CA USA

Real-time Motion Tracking from a Mobile Robot

Jung, Boyoon; Sukhatme, Gaurav S; Jan 2005; 19 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DABT63-99-1-0015

Report No.(s): AD-A459071; CRES-TR-05-008; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459071>; Avail.: CASI: **A03**, Hardcopy

A mobile robot needs to perceive the motions of external objects to perform tasks successfully in a dynamic environment. We propose a set of algorithms for multiple motion tracking from a mobile robot equipped with a monocular camera and a laser rangefinder. The key challenges are 1. to compensate the ego-motion of the robot for external motion detection, and 2. to cope with transient and structural noise for robust motion tracking. In our algorithms, the robot ego-motion is directly estimated using corresponding feature sets in two consecutive images, and the position and velocity of a moving object is estimated in image space using multiple particle filters. The estimates are fused with the depth information from the laser range finder to estimate the partial 3D position. The proposed algorithms have been tested with various configurations in outdoor environments. The algorithms were deployed on three different platforms; it was shown that various types of ego-motion were successfully eliminated and the particle filter was able to track motions robustly. The multiple target tracking algorithm was tested for different types of motions, and it was shown that our multiple filter approach is effective and robust. The tracking algorithm was integrated with a robot control loop, and its realtime capability was demonstrated.

DTIC

Detection; Real Time Operation; Robots; Target Acquisition

20070003171 California Univ., Santa Barbara, CA USA

Monitoring Environmental Boundaries with a Robotic Sensor Network

Susca, Sara; Martinez, Sonia; Bullo, Francesco; Mar 23, 2006; 27 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-03-1-0512

Report No.(s): AD-A459072; CCDC-TR-06-01-25; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459072>; Avail.: CASI: **A03**, Hardcopy

In this paper, we propose and analyze two algorithms to monitor an environmental boundary with mobile sensors. The objective is to optimally approximate the boundary with a polygon. In the first scenario the mobile sensors know the boundary and the approximating polygon is defined by the sensors' positions. In the second scenario the mobile sensors rely only on sensed local information to position some interpolation points and define an approximating polygon. For both scenarios we design algorithms that distribute the vertices of the approximating polygon uniformly along the boundary. The notion of uniform placement relies on a metric inspired by known results on approximation of convex bodies. The first algorithm is proved to converge in the case of static boundaries whereas the second one is provably convergent also for slowly-moving boundaries because of certain input-to-state stability properties.

DTIC

Computer Networks; Detectors; Robotics

20070003176 Washington Univ., Seattle, WA USA

Iterated Local Optimization for Minimum Energy Broadcast

Kang, Intae; Poovendran, Radha; Apr 2005; 11 pp.; In English

Contract(s)/Grant(s): N00014-04-1-0479

Report No.(s): AD-A459079; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459079>; Avail.: CASI: **A03**, Hardcopy

In our prior work, we presented a highly effective local search based heuristic algorithm called the Largest Expanding Sweep Search (LESS) to solve the minimum energy broadcast (MEB) problem over wireless, ad hoc, or sensor networks. In this paper, the performance is further strengthened by using iterated local optimization (ILO) techniques at the cost of additional computational complexity. To the best of our knowledge, this implementation constitutes currently the best performing algorithm among the known heuristics for MEB. We support this claim through extensive simulation study, comparing with globally optimal solutions obtained by an integer programming (IP) solver. For small network size up to 20 nodes, which is imposed by practical limitation of the IP solver, the ILO based algorithm produces globally optimal solutions with very high frequency ($\approx 70\%$), and average performance is within 1.12% of the optimal solution.

DTIC

Algorithms; Broadcasting; Computer Networks; Wireless Communication

20070003177 Nebraska Univ., Lincoln, NE USA

Controlling Factors in Evaluating Path-sensitive Error Detection Techniques

Dwyer, Matthew B; Person, Suzette; Elbaum, Sebastian; Jan 2006; 12 pp.; In English

Contract(s)/Grant(s): W911NF-04-1-0104; NSF-0429149

Report No.(s): AD-A459081; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459081>; Avail.: CASI: [A03](#), Hardcopy

Recent advances in static program analysis have made it possible to detect errors in applications that have been thoroughly tested and are in wide-spread use. The ability to find errors that have eluded traditional validation methods is due to the development and combination of sophisticated algorithmic techniques that are embedded in the implementations of analysis tools. Evaluating new analysis techniques is typically performed by running an analysis tool on a collection of subject programs, perhaps enabling and disabling a given technique in different runs. While seemingly sensible, this approach runs the risk of attributing improvements in the cost-effectiveness of the analysis to the technique under consideration, when those improvements may actually be due to details of analysis tool implementations that are uncontrolled during evaluation. In this paper, we focus on the specific class of path-sensitive error detection techniques and identify several factors that can significantly influence the cost of analysis. We show, through careful empirical studies, that the influence of these factors is sufficiently large that, if left uncontrolled, they may lead researchers to improperly attribute improvements in analysis cost and effectiveness. We make several recommendations as to how the influence of these factors can be mitigated when evaluating techniques.

DTIC

Algorithms; Detection; Errors; Sensitivity

20070003197 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA

Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792

Karwatka, Mike; Packer, Bonnie; Nov 2006; 52 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-8-CO-160-UXO-021

Report No.(s): AD-A459110; ATC-9235; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459110>; Avail.: CASI: [A04](#), Hardcopy

This scoring record documents the efforts of Geocenters SAIC to detect and discriminate inert unexploded ordnance (UXO) utilizing the APG Standardized UXO Technology Demonstration Site Blind Grid. Scoring Records have been coordinated by Mike Karwatka and the Standardized UXO Technology Demonstration Site Scoring Committee. Organizations on the committee include, the U S Army Corps of Engineers, the Environmental Security Technology Certification Program, the Strategic Environmental Research and Development Program, the Institute for Defense Analysis, the U S. Army Environmental Center, and the U.S. Army Aberdeen Test Center.

DTIC

Ammunition; Scoring; Standardization; Test Facilities

20070003277 Army Research Lab., Aberdeen Proving Ground, MD USA

Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation

Brennan, John K; Rice, Betsy M; Nov 2006; 32 pp.; In English

Contract(s)/Grant(s): Proj-H4311

Report No.(s): AD-A459271; ARL-TR-3983; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459271>; Avail.: CASI: [A03](#), Hardcopy

We demonstrate the applicability of the Reaction Ensemble Monte Carlo (RxMC) simulation method for calculating the shock Hugoniot properties of a material. The method does not require interaction potentials that simulate bond breaking or bond forming; it requires only the intermolecular potentials and the ideal-gas partition functions for the reactive species that are present. By performing Monte Carlo sampling of forward and reverse reaction steps, RxMC provides information on the chemical equilibria states of the shocked material including the density of the reactive mixture and the mole fractions of the reactive species. We illustrate the methodology for shocked liquid N₂, where we find excellent agreement with experimental measurements. This is the first of two reports describing the applicability of the RxMC method to simulating the shock Hugoniot properties of materials.

DTIC

Gas Dissociation; Nitrogen; Simulation

20070003294 Massachusetts Inst. of Tech., Cambridge, MA USA

Some Discrete Approximations to a Variational Method for Image Segmentation

Kulkarni, S R; Mitter, S K; Jan 3, 1991; 14 pp.; In English

Contract(s)/Grant(s): DAAL03-86-K-0171; AFOSR-89-0276

Report No.(s): AD-A459293; LIDS-P-2014; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459293>; Avail.:

CASI: A03, Hardcopy

Variational formulations have been proposed for a number of tasks in early vision. Discrete versions of these problems are closely related to Markov random field models and are typically used in implementing such methods. In particular, discrete and continuous versions for the problem of image segmentation have received considerable attention from both theoretical and algorithmic perspectives. It has been previously pointed out that the usual discrete version of the segmentation problem does not properly approximate the continuous formulation in the sense that the discrete solutions may not converge to a solution of the continuous problem as the lattice spacing tends to zero. One method for modifying the discrete formulations to ensure such convergence has been previously discussed. Here we consider two other partially discrete formulations which also satisfy desirable convergence properties in the continuum limit, and we discuss some general ideas about digitized versions of the variational formulation of the segmentation problem.

DTIC

Imaging Techniques

20070003303 Maryland Univ., College Park, MD USA

An Appearance Based Approach for Human and Object Tracking

Balcells Capellades, Marti; Dec 2002; 79 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA904-00-C-2110

Report No.(s): AD-A459305; LAMP-TR-103; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459305>; Avail.:

CASI: A05, Hardcopy

We have implemented a system for tracking humans and detecting human-object interactions. Persistent tracking of humans and objects in a video sequence is an important task in surveillance application. Pose and illumination variations, occlusion, appearance and disappearance of humans in the scene, etc... are some of the challenges one has to face. We present an appearance based approach to the problem. A combination of correlogram and histogram information is used to model object and human color distributions. Humans and objects are detected using a background subtraction algorithm. The models are built on the fly and used to track them on a frame by frame basis. The system is able to detect when humans merge into groups and segment them during occlusion. Identities are preserved during all the sequence, even if a person enters and leaves the scene. The system is also able to detect when a person deposits or removes an object from the scene. In the first case the models are used to track the object retroactively in time. In the second case the objects are tracked for the rest of the sequence. The model is able to overcome common deformations as well as many situations involving occlusion. Furthermore, it is easy to update. We assume a static camera and focus on compressed images taken in an indoor environment. The results show that this is a powerful processing technique providing important information to algorithms performing higher level analysis such as activity recognition, where human-object interactions play an important role.

DTIC

Sequencing

20070003309 Massachusetts Inst. of Tech., Cambridge, MA USA

Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data

Chou, K C; Willsky, A S; Feb 1990; 54 pp.; In English

Contract(s)/Grant(s): DAAL03-86-K-0171; AFOSR-88-0032

Report No.(s): AD-A459314; LIDS-P-1947; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459314>; Avail.:

CASI: A04, Hardcopy

In a previous paper [7] we introduced a class of multiscale dynamic models evolving on dyadic trees in which each level in the tree corresponds to the representation of a signal at a particular scale. One of the estimation algorithms suggested in [7] led to the introduction of a new class of Riccati equations describing the evolution of the estimation error covariance as multiresolution data is fused in a fine-to-coarse direction. This equation can be thought of as having 3 steps in its recursive description: a measurement update step, a fine-to-coarse prediction step, and a fusion step. In this paper we analyze this class of equations. In particular by introducing several rudimentary elements of a system theory for processes on trees we develop bounds on the error covariance and use these in analyzing stability and steady-state behavior of the fine-to coarse filter and the Riccati equations. While this analysis is similar in spirit to that for standard Riccati equations and Kalman filters, there

are substantial differences that arise in the multiscale context. For example, the asymmetry of the dyadic tree makes it necessary to define multiscale processes via a coarse- to-fine dynamic model and also to define the first step in a fusion processor in the opposite direction - i.e. fine-to-coarse. Also, the notions of stability, reachability, and observability are different. Most importantly for the analysis here, we will see that the fusion step in the fine-to-coarse filter and Riccati equation requires that we focus attention on the maximum likelihood estimator in order to develop a stability and steady-state theory.

DTIC

Algorithms; Image Resolution; Riccati Equation

20070003345 South Carolina Univ., Columbia, SC USA

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions

Sutton, Michael A; Deng, Xiaomin; Zuo, Jianzheng; Mar 2006; 89 pp.; In English

Contract(s)/Grant(s): FA8650-04-D-3446-0001; Proj-A02P

Report No.(s): AD-A459417; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459417>; Avail.: CASI: [A05](#),

Hardcopy

This report summarizes work done to develop an analytical method to predict stable tearing crack path and shapes under complex mixed mode loading conditions using large deformation kinematics. A simulation program, CRACK3D, was developed as part of this effort. This report also documents the strategies used to automatically re-mesh finite elements around the crack tip in CRACK3D.

DTIC

Algorithms; Computer Programs; Crack Propagation; Deformation; Kinematics; Tearing

20070003352 Washington Univ., Seattle, WA USA

COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks

Kang, Intae; Poovendran, Radha; Jan 2004; 7 pp.; In English

Contract(s)/Grant(s): ANI-0093187; DAAD19-02-1-0242

Report No.(s): AD-A459433; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459433>; Avail.: CASI: [A02](#),

Hardcopy

In this paper we provide the initial framework for the study of center-oriented broadcast routing problems using omnidirectional antennas. From the intuition that the best place to take advantage of the wireless broadcast advantage is at the center of a network deploy region, we concretize this idea into a currently best performing power-efficient broadcast routing algorithm for wireless adhoc networks. We support this statement with extensive simulation studies.

DTIC

Algorithms; Broadcasting; Local Area Networks; Wireless Communication

20070003355 California Univ., Santa Cruz, CA USA

Routing in Packet-Switched Networks Using Path-Finding Algorithms

Murthy, Shree; Sep 1996; 166 pp.; In English

Contract(s)/Grant(s): N00014-92-J-1867; DAAAB07-95-C-D157

Report No.(s): AD-A459441; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459441>; Avail.: CASI: [A08](#),

Hardcopy

Route assignment is one of the operational problems of a communication network. The function of a routing algorithm is to guide packets through the communication network to their correct destinations. This dissertation is on the design and analysis of distributed, adaptive routing algorithms and protocols for packet switching networks. We introduce the general framework on which these algorithms are based. Using this general model, we propose several routing techniques to suit heterogeneous environments. In this dissertation, we concentrate on distance-vector algorithms. One important drawback of previous distance-vector algorithms based on the distributed Bellman-Ford algorithm for shortest-path computation is that they suffer from counting-to-infinity problem and the bouncing effect. Recently, distributed shortest-path algorithms which utilize information about distance and second-to-last hop along the shortest-path to each destination have been proposed. This class of algorithms are called path-finding algorithms. Our proposals are based on path-finding algorithms.

DTIC

Algorithms; Communication Networks; Switching

20070003450 Helsinki Univ. Central Hospital, Helsinki, Finland

Direct and Inverse Scattering for Beltrami Fields

Martio, Olli, Editor; Annales Academiæ Scientiarum Fennicæ: Mathematica; 2006; ISSN 1239-6303; Volume 149, pp. 2006; In English; Original contains color illustrations; Copyright; Avail.: Other Sources

We consider an obstacle scattering problem for linear Beltrami fields. A vector field u is a linear Beltrami field if $\Delta x u = ku$ with a constant $k \neq 0$. We study the obstacles that are of Neumann type, that is, the normal component of the total field vanishes on the boundary of the obstacle. We prove the unique solvability for the corresponding exterior boundary value problem, in other words, the direct obstacle scattering model. For the inverse obstacle scattering problem, we deduce the formulas that are needed to apply the singular sources method. The numerical examples are computed for the direct scattering problem and for the inverse scattering problem.

Author

Inverse Scattering; Scattering; Boundary Value Problems; Boundaries; Linearity

20070003473 NASA Ames Research Center, Moffett Field, CA, USA

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains

Barth, Timothy J.; Sethian, James A.; September 1997; 1 pp.; In English

Contract(s)/Grant(s): RTOP 519-40-12; No Copyright; Avail.: Other Sources; Abstract Only

Borrowing from techniques developed for conservation law equations, numerical schemes which discretize the Hamilton-Jacobi (H-J), level set, and Eikonal equations on triangulated domains are presented. The first scheme is a provably monotone discretization for certain forms of the H-J equations. Unfortunately, the basic scheme lacks proper Lipschitz continuity of the numerical Hamiltonian. By employing a virtual edge flipping technique, Lipschitz continuity of the numerical flux is restored on acute triangulations. Next, schemes are introduced and developed based on the weaker concept of positive coefficient approximations for homogeneous Hamiltonians. These schemes possess a discrete maximum principle on arbitrary triangulations and naturally exhibit proper Lipschitz continuity of the numerical Hamiltonian. Finally, a class of Petrov-Galerkin approximations are considered. These schemes are stabilized via a least-squares bilinear form. The Petrov-Galerkin schemes do not possess a discrete maximum principle but generalize to high order accuracy.

Author

Hamilton-Jacobi Equation; Triangulation; Numerical Analysis; Domains; Eikonal Equation

20070003497 NASA Langley Research Center, Hampton, VA, USA

A Comparison of Two Balance Calibration Model Building Methods

DeLoach, Richard; Ulbrich, Norbert; [2007]; 81 pp.; In English; 45th AIAA Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2007, Reno, NV, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): NNA04BA85C; WBS 076.07.80

Report No.(s): AIAA Paper 2007-0147; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070003497>; Avail.: CASI: A05, Hardcopy

Simulated strain-gage balance calibration data is used to compare the accuracy of two balance calibration model building methods for different noise environments and calibration experiment designs. The first building method obtains a math model for the analysis of balance calibration data after applying a candidate math model search algorithm to the calibration data set. The second building method uses stepwise regression analysis in order to construct a model for the analysis. Four balance calibration data sets were simulated in order to compare the accuracy of the two math model building methods. The simulated data sets were prepared using the traditional One Factor At a Time (OFAT) technique and the Modern Design of Experiments (MDOE) approach. Random and systematic errors were introduced in the simulated calibration data sets in order to study their influence on the math model building methods. Residuals of the fitted calibration responses and other statistical metrics were compared in order to evaluate the calibration models developed with different combinations of noise environment, experiment design, and model building method. Overall, predicted math models and residuals of both math model building methods show very good agreement. Significant differences in model quality were attributable to noise environment, experiment design, and their interaction. Generally, the addition of systematic error significantly degraded the quality of calibration models developed from OFAT data by either method, but MDOE experiment designs were more robust with respect to the introduction of a systematic component of the unexplained variance.

Author

Calibrating; Mathematical Models; Loads (Forces); Wind Tunnel Tests; Strain Gage Balances; Simulation

STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20070002120 Massachusetts Univ., Amherst, MA USA

Cross-Document Coreference on a Large Scale Corpus

Gooi, Chung H; Allan, James; Jan 2004; 9 pp.; In English

Contract(s)/Grant(s): N66001-02-1-8903; MDA904-01-C-0984

Report No.(s): AD-A458579; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458579>; Avail.: CASI: A02, Hardcopy

In this paper, we will compare and evaluate the effectiveness of different statistical methods in the task of cross-document coreference resolution. We created entity models for different test sets and compare the following disambiguation and clustering techniques to cluster the entity models in order to create coreference chains: Incremental Vector Space, KL-Divergence, Agglomerative Vector Space. Coreference analysis refers to the process of determining whether or not two mentions of entities refer to the same person (Kibble and Deemter, 2000).

DTIC

Statistical Analysis; Cluster Analysis; Models

20070002778 Lawrence Livermore National Lab., Livermore, CA USA

Hierarchical Bayesian Approach to Locating Seismic Events

Johannesson, G.; Myers, S. C.; Hanley, W. G.; Nov. 14, 2005; 14 pp.; In English

Report No.(s): DE2006-888581; UCRL-PROC-217057; No Copyright; Avail.: National Technical Information Service (NTIS)

We propose a hierarchical Bayesian model for conducting inference on the location of multiple seismic events (earthquakes) given data on the arrival of various seismic phases to sensor locations. The model explicitly accounts for the uncertainty associated with a theoretical seismic-wave travel-time model used along with the uncertainty of the arrival data. Posterior inferences is carried out using Markov chain Monte Carlo (MCMC).

NTIS

Bayes Theorem; Earthquakes; Position (Location); Seismology

20070003031 California Univ., Santa Barbara, CA USA

Moment Closure for the Stochastic Logistic Model

Singh, Abhyudai; Hespanha, Joao P; Jan 16, 2006; 28 pp.; In English

Contract(s)/Grant(s): DAAD19-03-D-0004

Report No.(s): AD-A458857; CCDC-06-0117; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458857>; Avail.: CASI: A03, Hardcopy

Continuous-time birth-death Markov processes serve as useful models in population biology. When the birth-death rates are nonlinear, the time evolution of the first n order moments of the population is not closed, in the sense that it depends on moments of order higher than n . For analysis purpose, the time evolution of the first n order moments is often made to be closed by approximating these higher order moments as a nonlinear function of moments up to order n , which we refer to as the moment closure function. In this paper, a systematic procedure for constructing moment closure functions of arbitrary order is presented for the stochastic logistic model. We obtain the moment closure function by first assuming a certain separable form for it, and then matching time derivatives of the exact (not closed) moment equations with that of the approximate (closed) equations for some initial time and set of initial conditions. The separable structure ensures that the steady-state solutions for the approximate equations are unique, positive and real, while the derivative matching guarantees a good approximation, at-least locally in time. Moreover, the accuracy of the approximation can be improved by increasing the order of the approximate model. Other moment closure functions previously proposed in the literature are also investigated.

DTIC

Mathematical Models; Stochastic Processes

20070003057 Pennsylvania Univ., Philadelphia, PA USA

Semantic Tagging using a Probabilistic Context Free Grammar

Collins, Michael; Miller, Scott; Jan 1998; 12 pp.; In English

Contract(s)/Grant(s): DABT63-94-C-0062

Report No.(s): AD-A458893; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458893>; Avail.: CASI: A03,

Hardcopy

This paper describes a statistical model for extraction of events at the sentence level, or 'semantic tagging', typically the first level of processing in Information Extraction systems. We illustrate the approach using a management succession task, tagging sentences with three slots involved in each succession event: the post, person coming into the post, and person leaving the post. The approach requires very limited resources: a part-of-speech tagger; a morphological analyzer; and a set of training examples that have been labeled with the three slots and the indicator (verb or noun) used to express the event. Training on 560 sentences, and testing on 356 sentences, shows the accuracy of the approach is 77.5% (if partial slot matches are deemed incorrect) or 87.8% (if partial slot matches are deemed correct).

DTIC

Grammars; Information Retrieval; Marking; Semantics; Statistical Analysis

20070003062 California Univ., Davis, CA USA

Advances in Mixed Signal Processing for Regional and Teleseismic Arrays

Shumway, Robert H; Aug 15, 2006; 43 pp.; In English

Contract(s)/Grant(s): FA8718-04-C-0013; Proj-1010

Report No.(s): AD-A458899; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458899>; Avail.: CASI: A03,

Hardcopy

This project considers possible approaches to resolving mixtures of propagating signals observed on arrays. In particular, conventional approaches such as beam-forming, MUSIC and single-signal F-statistics have flaws that will not adapt to certain mixtures. In order to solve this problem, we derive the partial F-statistic for testing for an added signal in a multiple-signal model. In this case a combination of sequential nonlinear partial F-statistics in combination with Akaike's corrected model selection criterion AICC leads to determining the correct configuration of signals and their velocities and azimuths. The conventional estimators and the new estimators are applied to known and unknown configurations of regional signals from China and to a teleseismic mixture involving two known earthquakes and noise caused by an ocean storm. We also analyze a regional event with propagating noise and show that a deconvolution based on the two velocities and azimuths gives an enhanced view of the depth phase. Software as well as internal and external documentation is provided in the form of MATLAB subroutines that can be incorporated into government research tools such as MATSEIS. We provide software for (1) time-frequency analysis, (2) F, MUSIC and Capon detectors, (3) multiple signal analysis, (4) bootstrap confidence intervals and (5) deconvolution.

DTIC

Seismic Waves; Sequential Analysis; Signal Processing; Subroutines

20070003063 Massachusetts Inst. of Tech., Cambridge, MA USA

An Interim Report of Research on Stochastic and Adaptive Systems

Athans, Michael; Mitter, Sanjoy K; Valavani, Lena; Mar 20, 1981; 27 pp.; In English

Contract(s)/Grant(s): AFOSR-77-3281C

Report No.(s): AD-A458900; LIDS-IR-1081; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458900>; Avail.:

CASI: A03, Hardcopy

The research we have conducted over the past several years and in particular during the period February 1, 1980 to January 31, 1981 has been concerned with fundamental aspects of controlling linear and non-linear stochastic systems in the presence of measurement and parameter uncertainties. In case the uncertainties reside in the state description of the physical system and measurements then we refer to the control problem as a stochastic control problem. If in addition there are parameter uncertainties, then the problem is referred to as an adaptive control problem. This is because in addition to state estimation some form of parameter identification scheme will be needed and almost always the control and estimation-identification functions will interact in a non-trivial nonlinear and time-varying way.

DTIC

Adaptation; Stochastic Processes

20070003098 Brown Univ., Providence, RI USA

Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods

Kushner, Harold J; Jan 2006; 8 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0928

Report No.(s): AD-A458950; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458950>; Avail.: CASI: A02, Hardcopy

Consider a communications network consisting of mobiles, some of which can serve as a receiver and/or transmitter in a multihop path. There are random external data processes, each destined for some destinations. At each mobile the data is queued according to the source-destination pair until transmitted. The capacities of the connecting channels are randomly varying. Time is divided into small scheduling intervals. At the beginning of the intervals, the channels are estimated via pilot signals and this information is used for the scheduling decisions during the interval, concerning the allocation of transmission power and/or time, bandwidth, and perhaps antennas, to the various queues in a queue and channel-state dependent way, to assure stability. Lost packets might or might not have to be retransmitted. General networks are covered, conditions used in previous works are weakened, and the distributions of the input file lengths can be heavy tailed. The resulting controls are readily implementable. The choice of Liapunov function allows a range of trade-offs between current rates and queue lengths, under very weak conditions. Because of the non-Markovian nature of the problem, we use the perturbed Stochastic Liapunov function method, which is designed for such problems. Extensions concerning acknowledgments, multicasting, non-unique routes, and others, are available.

DTIC

Communication Networks; Mobile Communication Systems; Scheduling; Stability; Stochastic Processes

20070003119 Brown Univ., Providence, RI USA

Dynamic Importance Sampling for Queueing Networks

Dupuis, Paul; Sezer, Ali D; Wang, Hui; Dec 16, 2005; 53 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1- 0425; W911NF-05-1-0289

Report No.(s): AD-A458985; 2005-009; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458985>; Avail.: Defense Technical Information Center (DTIC)

Importance sampling is a technique that is commonly used to speed up Monte Carlo simulation of rare events. However, little is known regarding the design of efficient importance sampling algorithms in the context of queueing networks. The standard approach, which simulates the system using an a priori fixed change of measure suggested by large deviation analysis, has been shown to fail in even the simplest network setting (e.g., a two-node tandem network). Exploiting connections between importance sampling, differential games, and classical subsolutions of the corresponding Isaacs equation, we show how to design and analyze simple and efficient dynamic importance sampling schemes for general classes of networks. The models used to illustrate the approach include d-node tandem Jackson networks and a two node network with feedback, and the rare events studied are those of large queueing backlogs, including total population overflow and the overflow of individual buffers.

DTIC

Networks; Queueing Theory; Sampling

20070003121 Brown Univ., Providence, RI USA

Importance Sampling for Sums of Random Variables With Regularly Varying Tails

Dupuis, Paul; Leder, Kevin; Wang, Hui; Jan 2006; 24 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1- 0425; W911NF-05-1-0289

Report No.(s): AD-A458987; LCDS-2006-003; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458987>; Avail.: CASI: A03, Hardcopy

Importance sampling is a variance reduction technique for efficient estimation of rare-event probabilities by Monte Carlo. For random variables with heavy tails there is little consensus on how to choose the change of measure used in importance sampling. In this paper we study dynamic importance sampling schemes for sums of independent and identically distributed random variables with regularly varying tails. The number of summands can be random but must be independent of the summands. For estimating the probability that the sum exceeds a given threshold, we explicitly identify a class of dynamic importance sampling algorithms with bounded relative errors. In fact, these schemes are nearly asymptotically optimal in the

sense that the second moment of the corresponding importance sampling estimator can be made as close as desired to the minimal possible value.

DTIC

Random Variables; Sampling; Sums

20070003168 University of Southern California, Los Angeles, CA USA

Analysis of Dynamic Task Allocation in Multi-Robot Systems

Lerman, Kristina; Jones, Chris; Galstyan, Aram; Mataric, Maja J; Jan 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-00-2-0573

Report No.(s): AD-A459067; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459067>; Avail.: CASI: A03, Hardcopy

Dynamic task allocation is an essential requirement for multi-robot systems operating in unknown dynamic environments. It allows robots to change their behavior in response to environmental changes or actions of other robots in order to improve overall system performance. Emergent coordination algorithms for task allocation that use only local sensing and no direct communication between robots are attractive because they are robust and scalable. However, a lack of formal analysis tools makes emergent coordination algorithms difficult to design. In this paper we present a mathematical model of a general dynamic task allocation mechanism. Robots using this mechanism have to choose between two types of task, and the goal is to achieve a desired task division in the absence of explicit communication and global knowledge. Robots estimate the state of the environment from repeated local observations and decide which task to choose based on these observations. We model the robots and observations as stochastic processes and study the dynamics of the collective behavior. Specifically, we analyze the effect that the number of observations and the choice of the decision function have on the performance of the system. The mathematical models are validated in a multi-robot multi-foraging scenario. The model's predictions agree very closely with experimental results from sensor-based simulations.

DTIC

Robots; Stochastic Processes

20070003292 Massachusetts Inst. of Tech., Cambridge, MA USA

Modeling and Estimation of Multiresolution Stochastic Processes

Basseville, Michele; Benveniste, Albert; Chou, Kenneth C; Golden, Stuart A; Nikoukhah, Ramine; Willsky, Alan S; Mar 1991; 63 pp.; In English

Contract(s)/Grant(s): AFOSR-88-0032; ECS-8700903

Report No.(s): AD-A459289; LIDS-P-2022; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459289>; Avail.: CASI: A04, Hardcopy

In this paper, we provide an overview of the several components of a research effort aimed at the development of a theory of multiresolution stochastic modeling and associated techniques for optimal multiscale statistical signal and image processing. As we describe, a natural framework for developing such a theory is the study of stochastic processes indexed by nodes on lattices or trees in which different depths in the tree or lattice correspond to different spatial scales in representing a signal or image. In particular we will see how the wavelet transform directly suggests such a modeling paradigm. This perspective then leads directly to the investigation of several classes of dynamic models and related notions of 'multiscale stationarity' in which scale plays the role of a time-like variable. In this paper we focus primarily on the investigation of models on homogeneous trees. In particular we describe the elements of a dynamic system theory on trees and introduce two notions of stationarity. One of these leads naturally to the development of a theory of multiscale autoregressive modeling including a generalization of the celebrated Schur and Levinson algorithms for order-recursive model building. The second, weaker notion of stationarity leads directly to a class of state space models on homogeneous trees. We describe several of the elements of the system theory for such models and also describe the natural, extremely efficient algorithmic structures for optimal estimation that these models suggest: one class of algorithms has a multigrid relaxation structure; a second uses the scale-to-scale whitening property of wavelet transforms for our models; and a third leads to a new class of Riccati equations involving the usual predict and update steps and a new 'fusion' step as information is propagated from fine to coarse scales. As we will see, this framework allows us to consider in a very natural way the fusion of data from sensors with differing resolution

DTIC

Image Resolution; Stochastic Processes

20070003313 Massachusetts Inst. of Tech., Cambridge, MA USA

Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms

Chou, K C; Golden, S A; Willsky, A S; May 1992; 58 pp.; In English

Contract(s)/Grant(s): DAAL03-86-K-0171; AFOSR-92-J-0002

Report No.(s): AD-A459326; LIDS-P-2110; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459326>; Avail.:

CASI: A04, Hardcopy

In this paper we describe and analyze a class of multiscale stochastic processes which are modeled using dynamic representations evolving in scale based on the wavelet transform. The statistical structure of these models is Markovian in scale, and in addition the eigenstructure of these models is given by the wavelet transform. The implication of this is that by using the wavelet transform we can convert the apparently complicated problem of fusing noisy measurements of our process at several different resolutions into a set of decoupled, standard recursive estimation problems in which scale plays the role of the time-like variable. In addition we show how the wavelet transform, which is defined for signals that extend from $-\infty$ to $+\infty$, can be adapted to yield a modified transform matched to the eigenstructure of our multiscale stochastic models over finite intervals. Finally, we illustrate the promise of this methodology by applying it to estimation problems, involving single and multi-scale data, for a first-order Gauss-Markov process. As we show, while this process is not precisely in the class we define, it can be well-approximated by our models, leading to new, highly parallel, and scale-recursive estimation algorithms for multi-scale data fusion. In addition our framework extends immediately to 2D signals where the computational benefits are even more significant.

DTIC

Image Resolution; Multisensor Fusion; Stochastic Processes; Wavelet Analysis

20070003315 Massachusetts Inst. of Tech., Cambridge, MA USA

Multiscale Smoothing Error Models

Luetgen, Mark R; Willsky, Alan S; Mar 1994; 12 pp.; In English

Contract(s)/Grant(s): AFOSR-92-J-0002; N00014-91-J-1004

Report No.(s): AD-A459332; LIDS-P-2234; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459332>; Avail.:

CASI: A03, Hardcopy

A class of multiscale stochastic models based on scale-recursive dynamics on trees has recently been introduced. These models are interesting because they can be used to represent a broad class of physical phenomena and because they lead to efficient algorithms for estimation and likelihood calculation. In this paper, we provide a complete statistical characterization of the error associated with smoothed estimates of the multiscale stochastic processes described by these models. In particular, we show that the smoothing error is itself a multiscale stochastic process with parameters which can be explicitly calculated.

DTIC

Error Analysis; Multiscale Models; Smoothing; Stochastic Processes

20070003323 Massachusetts Inst. of Tech., Cambridge, MA USA

Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination

Luetgen, Mark R; Willsky, Alan S; Jan 1993; 43 pp.; In English

Contract(s)/Grant(s): DAAH01-93-C-R021; AFOSR-92-J-0002

Report No.(s): AD-A459352; LIDS-P-2186; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459352>; Avail.:

CASI: A03, Hardcopy

A class of multiscale stochastic models based on scale-recursive dynamics on trees has recently been introduced. Theoretical and experimental results have shown that these models provide an extremely rich framework for representing both processes which are intrinsically multiscale, e.g., $1/f$ processes, as well as 1-D Markov processes and 2-D Markov random fields. Moreover, efficient optimal estimation algorithms have been developed for these models by exploiting their scale-recursive structure. In this paper, we exploit this structure in order to develop a computationally efficient and parallelizable algorithm for likelihood calculation. We illustrate one possible application to texture discrimination and demonstrate that likelihood-based methods using our algorithm have substantially better probability of error characteristics than well-known least-squares methods, and achieve performance comparable to that of Gaussian Markov random field based techniques, which in general are prohibitively complex computationally.

DTIC

Algorithms; Multiscale Models; Stochastic Processes; Textures

20070003324 Massachusetts Inst. of Tech., Cambridge, MA USA

Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction

Bhatia, M; Karl, W C; Willsky, A S; Jan 1993; 36 pp.; In English

Contract(s)/Grant(s): N00014-91-J-1004; DAAL03-92-G-0115

Report No.(s): AD-A459354; LIDS-P-2196; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459354>; Avail.:

CASI: [A03](#), Hardcopy

We use a multiscale natural pixel type representation of an object, originally developed for incomplete data problems, to construct nearly orthonormal basis functions. The coefficients of expansion of an object in these basis functions are obtained as the 1-D wavelet transform of the (strip integral) projections of the object. This enables us to formulate a multiscale tomographic reconstruction technique wherein the object is reconstructed at multiple scales or resolutions. A complete reconstruction is obtained by combining the reconstructions at different scales. The nearly orthonormal behavior of the basis functions results in a system matrix, relating the input (the object coefficients) and the output (the projection data), which is extremely sparse. The system matrix, in addition to being sparse, is well-conditioned and has a symmetric block-Toeplitz structure if the angular projections are uniformly spaced between 0 degrees and 180 degrees. Fast inversion algorithms exist for these matrices. The multiscale reconstruction technique can find applications in object feature recognition directly from projection data, tackling ill-posed imaging problems where the projection data are incomplete and/or noisy, and construction of multiscale stochastic models for which fast estimation algorithms exist. In this paper, we include examples illustrating the above applications of our multiscale reconstruction technique.

DTIC

Multiscale Models; Stochastic Processes; Tomography; Wavelet Analysis

20070003445 Department of the Navy, Washington, DC USA

Method to Estimate Noise in Data

Ruffa, Anthony A, Inventor; Dec 20, 2004; 14 pp.; In English

Report No.(s): AD-D020270; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADD020270>; Avail.: CASI: [A03](#),

Hardcopy

A method for estimating uncorrelated noise in a distributed record of data including data samples that represent both signal and noise, provided that the signal is substantially in phase between adjacent data samples. The method begins with dividing the record of data into an even number of equal intervals. The method proceeds compiling a reduced data record by subtracting from every other data sample in the record of data one data sample that is adjacent to it. Finally, the method entails a step of estimating the noise power in the signal relative to the signal power by calculating the standard deviation as a measure of the magnitude of the noise.

DTIC

Data Transmission; Estimates; Patent Applications

66

SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20070002121 Massachusetts Inst. of Tech., Cambridge, MA USA

The MIT Summit Speech Recognition System: A Progress Report

Zue, Victor; Glass, James; Phillips, Michael; Seneff, Stephanie; Jan 1989; 12 pp.; In English

Contract(s)/Grant(s): N00039-85-C-0254

Report No.(s): AD-A458587; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458587>; Avail.: CASI: [A03](#),

Hardcopy

Recently, we initiated a project to develop a phonetically-based spoken language understanding system called SUMMIT. In contrast to many of the past efforts that make use of heuristic rules whose development requires intense knowledge engineering, our approach attempts to express the speech knowledge within a formal framework using well-defined mathematical tools. In our system, features and decision strategies are discovered and trained automatically, using a large body of speech data. This paper describes the system, and documents its current performance.

DTIC

Speech Recognition; Languages

20070003071 Army Engineer Research and Development Center, Vicksburg, MS USA

Parameter Estimation Tools for Hydrologic and Hydraulic Simulations

Hallberg, Jackie P; Nov 2006; 14 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458911; ERDC-TN-SWWRP-06-11; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458911>;

Avail.: CASI: [A03](#), Hardcopy

The purpose of this System-Wide Water Resources Program (SWWRP) technical note is to highlight some of the parameter estimation packages available and to demonstrate the application of some of those packages with U.S. Army Engineer Research and Development Center (ERDC) numerical models. Advantages and limitations of the various packages will be discussed, and examples with ADaptive Hydrology/Hydraulics (ADH) will be given.

DTIC

Hydrology; Mathematical Models; Parameter Identification; Simulation

20070003076 SRI International Corp., Menlo Park, CA USA

Belief and Incompleteness

Konolige, Kurt; Jul 13, 1984; 70 pp.; In English

Contract(s)/Grant(s): N00014-80-C-0296; F49620-82-K-0031

Report No.(s): AD-A458916; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458916>; Avail.: CASI: [A04](#),

Hardcopy

Both agents are state-of-the-art constructions, incorporating the latest AI research in chess playing, natural-language understanding, planning, etc. But because of the overwhelming combinatorics of chess, neither they nor the fastest foreseeable computers would be able to search the entire game tree to find out whether White has a forced win. Why then do they come to such an odd conclusion about their own knowledge of the game? The chess scenario is an anecdotal example of the way inaccurate cognitive models can lead to behavior that is less than intelligent in artificial agents. In this case, the agents' model of belief is not correct. They make the assumption that an agent actually knows all the consequences of his beliefs. S1 knows that chess is a finite game, and thus reasons that, in principle, knowing the rules of chess is all that is required to figure out whether White has a forced initial win. After learning that S2 does indeed know the rules of chess he comes to the erroneous conclusion that S2 also knows this particular consequence of the rules. And S2 himself, reflecting on his own knowledge in the same manner, arrives at the same conclusion, even though in actual fact he could never carry out the computations necessary to demonstrate it.

DTIC

Artificial Intelligence; Game Theory

20070003094 Brown Univ., Providence, RI USA

Scheduling and Control of Multi-Node Mobile Communications Systems With Randomly-Varying Channels by Stability Methods

Kushner, Harold J; Jul 2005; 22 pp.; In English

Contract(s)/Grant(s): W911NF-05-10928

Report No.(s): AD-A458944; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458944>; Avail.: CASI: [A03](#),

Hardcopy

We consider a communications network consisting of many mobiles. There are random external data processes arriving at some of the mobiles, each destined for a unique destination or set of destinations. Each mobile can serve as a node in the possibly multi-hop (and not necessarily unique) path from source to destination. At each mobile the data is queued according to the source-destination pair. Time is divided into small scheduling intervals. The capacity of the connecting channels are randomly varying. The system resources such as transmission power and/or time, bandwidth, and perhaps antennas, must be allocated to the various queues in a queue and channel-state dependent way to assure stability and good operation. Lost packets might or might not have to be retransmitted. At the beginning of the intervals, the channels are estimated via pilot signals and this information is used for the scheduling decisions, which are made at the beginning of the intervals. Stochastic stability methods are used to develop scheduling policies. The resulting controls are readily implementable and allow a range of tradeoffs between current rates and queue lengths, under very weak conditions. The basic methods are an extension of recent works for a system with one transmitter that communicates with many mobiles. The choice of Liapunov function allows a choice of the effective performance criteria. All essential factors are incorporated into a mean rate function, so that the results cover many different systems. Because of the non-Markovian nature of the problem, we use the perturbed Stochastic Liapunov

function method, which is designed for such problems. Various extensions (such as the requirement of acknowledgments) are given, as well as a useful method for getting the a priori routes.

DTIC

Mobile Communication Systems; Scheduling; Stability

20070003120 Washington Univ., Seattle, WA USA

Coverage in Heterogeneous Sensor Networks

Lazos, Loukas; Poovendran, Radha; Jan 2006; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-04-1-0479; W911NF-05-1-0491

Report No.(s): AD-A458986; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458986>; Avail.: CASI: [A03](#),

Hardcopy

In this paper we study the problem of coverage in heterogeneous planar sensor networks. Coverage as a performance metric, quantifies the quality of monitoring provided by the sensor network. We formulate the problem of coverage as a set intersection problem arising in Integral Geometry, and derive analytical expressions for stochastic coverage. Our formulation allows us to consider a heterogeneous sensing model, where sensors need not have an identical sensing capability. In addition, our approach is applicable to scenarios where the sensing area of each sensor has arbitrary shape and sensors are deployed according to any distribution. We present analytical expressions only for convex sensing areas, however, our results can be generalized to non-convex areas. The validity of our expressions is verified by extensive simulations.

DTIC

Heterogeneity; Networks

20070003123 Brown Univ., Providence, RI USA

Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Convergence Analysis

Dupuis, Paul; Wang, Hui; Aug 8, 2005; 34 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0425; W911NF-05-1-0289

Report No.(s): AD-A458989; LCDS-2005-008; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458989>; Avail.:

CASI: [A03](#), Hardcopy

Previous papers by authors establish the connection between importance sampling algorithms for estimating rare-event probabilities, two-person zero-sum differential games, and the associated Isaacs equation. In order to construct nearly optimal schemes in a general setting, one must consider dynamic schemes, i.e., changes of measure that, in the course of a single simulation, can depend on the outcome of the simulation up till that time. The present paper and a companion paper show that classical sense subsolutions of the Isaacs equation provide a basic and flexible tool for the construction and analysis of nearly optimal schemes. Asymptotic analysis is the topic of the present paper, while the companion paper focuses on explicit methods for the construction of subsolutions, implementation aspects and numerical results.

DTIC

Convergence; Game Theory

20070003155 International Computer Science Inst., Berkeley, CA USA

The ICSI+ Multilingual Sentence Segmentation System

Zimmerman, M; Hakkani-Tuer, D; Fung, J; Mirghafori, N; Gottlieb, L; Shriberg, E; Liu, Y; Jan 2006; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): HR0011-06-C-0023

Report No.(s): AD-A459046; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459046>; Avail.: CASI: [A01](#),

Hardcopy

The ICSI+ multilingual sentence segmentation with results for English and Mandarin broadcast news automatic speech recognizer transcriptions represents a joint effort involving ICSI, SRI, and UT Dallas. Our approach is based on using hidden event language models for exploiting lexical information, and maximum entropy and boosting classifiers for exploiting lexical, as well as prosodic, speaker change and syntactic information. We demonstrate that the proposed methodology including pitch- and energy-related prosodic features performs significantly better than a baseline system that uses words and simple pause features only. Furthermore, the obtained improvements are consistent across both languages, and no language-specific adaptation of the methodology is necessary. The best results were achieved by combining hidden event language models with

a boosting-based classifier that to our knowledge has not previously been applied for this task.

DTIC

Linguistics; Natural Language Processing; Segments; Sentences

20070003281 Maryland Univ., College Park, MD USA

Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions

Dorr, Bonnie; Gasterland, Terry; Aug 2002; 56 pp.; In English

Contract(s)/Grant(s): MDA90490-C6-1250

Report No.(s): AD-A459275; LAMP-TR-091; CS-TR-4391; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459275>; Avail.: CASI: A04, Hardcopy

Generating language that reflects the temporal organization of represented knowledge requires a language generation model that integrates contemporary theories of tense and aspect, temporal representations, and methods to plan text. This paper presents a model that produces event combinations and appropriate connecting words to relate them. We distinguish between inherent and non-inherent aspectual features of verbs and describe an algorithm that uses these features to select tense, aspect, and temporal connecting words for generating text based on time-stamped information. The main result of this work is the successful incorporation of constrained linguistic theories of tense and aspect in a self-contained module called CONGEN that produces a ranked list of temporal connectives and tense/aspect possibilities from pairs of time-stamped literals. We show that the theoretical results described herein have been verified in a large-scale corpus analysis. The framework serves as the basis of a component designed to enhance the English output of a constrained generation system.

DTIC

Connectors; Linguistics; Natural Language Processing; Words (Language)

67

THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

20070003069 SRI International Corp., Menlo Park, CA USA

The Role of Logic in Knowledge Representation and Commonsense Reasoning

Moore, Robert C; Jun 1982; 20 pp.; In English

Contract(s)/Grant(s): N00039-80-C-0575

Report No.(s): AD-A458909; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458909>; Avail.: CASI: A03,

Hardcopy

This paper examines the role that formal logic ought to play in representing and reasoning with commonsense knowledge. We take issue with the commonly held view (as expressed by Newell [1980]) that the use of representations based on formal logic is inappropriate in most applications of artificial intelligence. We argue to the contrary that there is an important set of issues, involving incomplete knowledge of a problem situation, that so far have been addressed only by systems based on formal logic and deductive inference, and that, in some sense, probably can be dealt with only by systems based on logic and deduction. We further argue that the experiments of the late 1960s on problem-solving by theorem-proving did not show that the use of logic and deduction in AI systems was necessarily inefficient, but rather that what was needed was better control of the deduction process, combined with more attention to the computational properties of axioms.

DTIC

Artificial Intelligence; Knowledge Representation

20070003085 Yale Univ., New Haven, CT USA

Robustness of Path-Vector Protocols Without Independent Route Ranking

Jaggard, Aaron D; Ramachandran, Vijay; Apr 2005; 33 pp.; In English

Contract(s)/Grant(s): N00014-99-1-0150; N00014-01-1-0795

Report No.(s): AD-A458929; YALEU/DCS/TR-1314; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458929>;

Avail.: CASI: A03, Hardcopy

Recent work has presented theoretical frameworks that rigorously model the behavior of path-vector protocols, which are primarily used for inter-domain routing on the Internet. We expand the scope of these to include protocols with route-selection procedures that cannot be captured by a per-node linear order on paths; in particular, our generalized model captures the use of commonly deployed route attributes such as MED, which is used to fine-tune routing between networks that share more

than one interconnection. Using the model, we give the best-known sufficient condition guaranteeing robust convergence of path-vector protocols in the generalized case and discuss its applications to protocol design.

DTIC

Internets; Protocol (Computers); Ranking; Robustness (Mathematics); Routes; Vector Spaces

20070003109 Brown Univ., Providence, RI USA

Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws

Costa, Bruno; Don, Wai S; Feb 22, 2006; 34 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-0123; DE-FG02-98ER25346

Report No.(s): AD-A458975; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458975>; Avail.: CASI: A03, Hardcopy

In this article we introduce the multi-domain hybrid Spectral-WENO method aimed at the discontinuous solutions of hyperbolic conservation laws. The main idea is to conjugate the non-oscillatory properties of the high order weighted essentially nonoscillatory (WENO) finite difference schemes with the high computational efficiency and accuracy of spectral methods. Built in a multi-domain framework, subdomain adaptivity in space and time is used in order to maintain the solutions parts exhibiting high gradients and discontinuities always inside WENO subdomains while the smooth parts of the solution are kept in spectral ones. A high order multi-resolution algorithm by Ami Harten is used to determine the smoothness of the solution in each subdomain. Numerical experiments with the simulation of compressible flow in the presence of shock waves are performed.

DTIC

Conservation; Conservation Laws; Shock Waves; Spectral Methods

20070003118 Brown Univ., Providence, RI USA

An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations

Wan, Xiaoliang; Karniadakis, George E; Mar 9, 2005; 32 pp.; In English

Report No.(s): AD-A458984; SCG-2005-05; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458984>; Avail.: CASI: A03, Hardcopy

We formulate a Multi-Element generalized Polynomial Chaos (ME-gPC) method to deal with long-term integration and discontinuities in stochastic differential equations. We first present this method for Legendre-chaos corresponding to uniform random inputs, and subsequently we generalize it to other random inputs. The main idea of ME-gPC is to decompose the space of random inputs when the relative error in variance becomes greater than a threshold value. In each subdomain or random element, we then employ a generalized Polynomial Chaos expansion. We develop a criterion to perform such a decomposition adaptively, and demonstrate its effectiveness for ODEs, including the Kraichnan-Orszag three-mode problem, as well as advection-diffusion problems. The new method is similar to spectral element method for deterministic problems but with h-p discretization of the random space.

DTIC

Chaos; Differential Equations; Polynomials; Random Variables; Stochastic Processes

20070003124 Universidade Federal do Rio de Janeiro, Brazil

Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws

Costa, Bruno; Don, Wai S; Gottlieb, David; Sendersky, Radislav; Feb 2006; 32 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-05-1-; 0123

Report No.(s): AD-A458991; 2006-02; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458991>; Avail.: CASI: A03, Hardcopy

The multi-domain hybrid Spectral-WENO(Weighted Essentially Non-Oscillatory) method (Hybrid) is introduced for the numerical solution of two dimensional nonlinear hyperbolic systems in a Cartesian physical domain which is partitioned into a grid of rectangular subdomains. The main idea of the Hybrid scheme is to conjugate the spectral and WENO methods for solving problems with shock or high gradients such that the scheme adapts its solver spatially and temporally depending on the smoothness of the solution in a given subdomain. Built as a multi-domain method, an adaptive algorithm is used to keep the solutions parts exhibiting high gradients and discontinuities always inside WENO subdomains while the smooth parts of the solution are kept inside a spectral one, avoiding oscillations related to the well-known Gibbs phenomenon and increasing the numerical efficiency of the overall scheme. A higher order version of the multiresolution analysis proposed by Harten is

used to determine the smoothness of the solution in each subdomain. We also discuss interface conditions for the two dimensional problem and the switching procedure between WENO and spectral subdomains. The Hybrid method is applied to the two-dimensional Shock-Vortex Interaction and the Richtmyer-Meshkov Instability (RMI) problems.

DTIC

Conservation Laws; Differential Geometry; Spectral Methods

20070003174 California Univ., Santa Barbara, CA USA

Notes on Averaging Over Acyclic Digraphs and Discrete Coverage Control

Gao, Chunkai; Bullo, Francesco; Cortes, Jorge; Jan 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-05-1-0219; ECS-0546871

Report No.(s): AD-A459077; TR-CCDC-06-0706; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459077>;

Avail.: CASI: [A03](#), Hardcopy

In this paper, we show the relationship between two algorithms and optimization problems that are the subject of recent attention in the networking and control literature. First, we obtain some results on averaging algorithms over acyclic digraphs with fixed and controlled-switching topology. Second, we discuss continuous and discrete coverage control laws. Further, we show how discrete coverage control laws can be cast as averaging algorithms defined over an appropriate graph that we term the discrete Voronoi graph.

DTIC

Algorithms; Liapunov Functions; Networks

20070003182 Naval Research Lab., Washington, DC USA

Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks

Meadows, Catherine; Poovendran, Radha; Pavlovic, Dusko; Chang, LiWu; Syverson, Paul; Jan 2006; 21 pp.; In English

Report No.(s): AD-A459088; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459088>; Avail.: CASI: [A03](#),

Hardcopy

Distance estimation, that is the estimate of the distance between two nodes, plays a fundamental part in the setting up and maintenance of sensor networks. For example, a node trying to localize itself, can, if it learns its distance from three or more nodes with known locations, use multilateration to determine where it sits. This computation is a major part of many localization algorithms. Distance estimation can also be useful in synchronization: if node A knows its distance from node B, it can request a timestamp from node B and compute the clock skew by factoring in the round trip time of the request and the response. One of the most accurate means of distance estimation is to use the time of flight of a signal. For example, one can send a signal to a seated node, have it respond, and then use the time of the round trip to measure the distance. For example, Multispectral Solutions has recently developed an ultra wide band ranging radio based on such technology that measures round trip times of packets to provide range resolution of better than one foot.

DTIC

Boundaries; Computer Information Security; Signal Processing

20070003193 Princeton Univ., NJ USA

A Sublinear Algorithm of Sparse Fourier Transform for Nonequispaced Data

Zhou, Jing; Aug 12, 2005; 28 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): AFOSR-109-6047

Report No.(s): AD-A459105; CSCAMM-05-11; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459105>; Avail.:

CASI: [A03](#), Hardcopy

We present a sublinear randomized algorithm to compute a sparse Fourier transform for nonequispaced data. We address the situation where a signal S is known to consist of N equispaced samples, of which only $L \ll N$ are available. This includes the case of 'equispaced data with gaps'; if the ratio $p=L/N$ is smaller than 1, the available data are typically non-equispaced samples, with little or no visible trace of the equispacing the full set of N samples. Then our algorithm reconstructs a near-optimal B -term representation R with high probability $1-\delta$, in time and space $\text{poly}(B, \log(L), \log p, \log(1/\delta), \epsilon^{-1})$, such that $\|S-R\|^2$ smaller or equal $(1 + \epsilon)\|S-R_{\text{opt}}^B\|^2$, where R_{opt}^B is the optimal B -term Fourier representation of signal S . The sublinear $\text{poly}(\log L)$ time is compared to the superlinear $O(N \log N + L)$ time requirement of the present best know Inverse Nonequispaced Fast Fourier Transform (INFFT) algorithms, in the sense of weighted norm with the number of dimensions δ , smoothness parameter B . Numerical experiments support the advantage in speed of our algorithm over other methods for sparse signals; it already outperforms INFFT for large but realistic

size N and works well even in the situation of a large percentage of missing data and in the presence of noise.

DTIC

Algorithms; Fast Fourier Transformations; Fourier Transformation

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*.

20070002139 University of Southern California, Los Angeles, CA USA

Compact, Portable Pulsed-Power

Gundersen, Marin A; Dickens, James; Nunnally, William; Aug 31, 2006; 21 pp.; In English

Contract(s)/Grant(s): F49620-01-1-0387

Report No.(s): AD-A458533; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458533>; Avail.: CASI: [A03](#),
Hardcopy

The desire to move high energy pulsed power systems from the laboratory to practical field systems has led to the establishment of the FY2001 Multidisciplinary University Research Initiative (MURI) on Compact, Portable, Pulsed Power (CP3). The University of New Mexico and the University of Southern California (USC) each lead a consortium of universities to address the fundamental issues critical to improved compact pulsed power. This report describes progress on this program by the USC lead consortium. Results are presented in the following key thematic areas: Gas phase and opening switches, increased energy density storage using liquid dielectrics, solid-state and optical switching. New results include advanced switches for repetitive pulsed power and innovative pulse generator (PG) design. Specific topics addressed are: Blumlein transmission lines, liquid breakdown in oil, water and propylene carbonate, pseudospark and Back-Lighted Thyatron (BLT) switches, compact pulsers, and high power solid-state switches. Applications that are emerging from this program include innovation in Blumlein architecture for HPM, Marx PGs for HPM, pseudospark PGs for AF jet ignition, ultra-compact PG for AF biological applications, and advanced PGs for cathode research for HPM.

DTIC

Dielectrics; Cathodes; Solid State; Optical Switching

20070002561 Gordon Research Conferences, Inc., New London, CT, USA

2006 Gordon Research Conference on Molecular and Ionic Cluster. Final Progress Report

January 2006; 8 pp.; In English

Report No.(s): DE2006-889210; No Copyright; Avail.: Department of Energy Information Bridge

The Gordon Research Conference (GRC) on MOLECULAR & IONIC CLUSTERS was held at Crowne Plaza from 2/19/2006 thru 2/24/2006. The Conference was well-attended with 89 participants. The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled.

NTIS

Conferences; Molecular Clusters; Ions

20070002565 Advanced Energy Systems, Inc., Medford, NY, USA

System and Method for Producing Terahertz Radiation

Tood, A. M.; Bluem, H. P.; Jackson, R. H.; 21 Jul 05; 13 pp.; In English

Contract(s)/Grant(s): SBIR-03118910

Patent Info.: Filed Filed 21 Jul 05; US-Patent-Appl-SN-11-186-429

Report No.(s): PB2007-103789; No Copyright; Avail.: CASI: [A03](#), Hardcopy

An apparatus for producing an annular electron beam comprises a cathode for generating electrons, a cavity having an annular shape and operable to receive the electrons, an energy input coupled to the cavity, where the energy input is operable to supply Radio Frequency (RF) energy at the cavity and an energy output coupled to the cavity and operable to receive

accelerated electrons from the cavity and operable to output the accelerated electrons as an annular electron beam.

NTIS

Electron Beams; Patent Applications

20070002573 Argonne National Lab., IL USA

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes

Lewellen, J. W.; Noonan, J.; 11 Oct 05; 21 pp.; In English

Contract(s)/Grant(s): DE-W-31-109-ENG-38

Patent Info.: Filed Filed 11 Oct 05; US-Patent-Appl-SN-11-248-661

Report No.(s): PB2007-103794; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A novel method of gating electron emission from field-emitter cathodes for radio frequency (RF) electrode guns and a novel cathode that provides a focused electron beam without the need for magnetic fields or a curved cathode surface are provided. The phase and strength of a predefined harmonic field, such as the 3rd harmonic field, are adjusted relative to a fundamental field to cause a field emission cathode to emit electrons at predefined times for the generation of high-brightness electron beams. The emission time is gated responsive to the combined harmonic and fundamental fields and the response of the FE cathode to the combined fields. A planar focusing cathode includes a selected dielectric material, such as a ceramic material, to provide an electron beam emission surface. Metal surfaces are provided both radially around and behind the dielectric material to shape the electric fields that accelerate and guide the beam from the cathode surface.

NTIS

Cathodes; Electron Beams; Electron Guns; Field Emission; Gates (Circuits); Patent Applications; Radio Frequencies

20070002578 Princeton Univ., NJ USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Lawrence Livermore National Lab., Livermore, CA USA

US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion

Davidson, R. C.; Logan, B. G.; Barnard, J. J.; Bieniosek, F. M.; Briggs, R. J.; January 2006; 8 pp.; In English

Report No.(s): DE2006-861981; No Copyright; Avail.: National Technical Information Service (NTIS)

Key scientific results from recent experiments, modeling tools, and heavy ion accelerator research are summarized that explore ways to investigate the properties of high energy density matter in heavy-ion-driven targets, in particular, strongly-coupled plasmas at 0.01 to 0.1 times solid density for studies of warm dense matter, which is a frontier area in high energy density physics. Pursuit of these near-term objectives has resulted in many innovations that will ultimately benefit heavy ion inertial fusion energy. These include: neutralized ion beam compression and focusing, which hold the promise of greatly improving the stage between the accelerator and the target chamber in a fusion power plant; and the Pulse Line Ion Accelerator (PLIA), which may lead to compact, low-cost modular linac drivers.

NTIS

Ion Accelerators; Ion Beams

20070002580 California Univ., Davis, CA, USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Open and Hidden Charm Production at RHIC and LHC

Vogt, R.; January 2006; 9 pp.; In English

Report No.(s): DE2006-861965; No Copyright; Avail.: Department of Energy Information Bridge

We discuss aspects of open and hidden charm production in hadron-nucleus collisions at RHIC and LHC energies. We first discuss the extraction of the total charm cross section in lower energy collisions and how it compares to next-to-leading order quantum chromodynamics calculations. We then describe calculations of the transverse momentum distributions and their agreement with the shape of the measured STAR transverse momentum distributions. We next explain how shadowing and moderate nuclear absorption can explain the PHENIX J/ψ dAu/pp ratios.

NTIS

Quantum Chromodynamics; Quarks; Charm (Particle Physics); Particle Production

20070002605 Maine and Asmus, Nashua, NH, USA

High Frequency via With Stripped Semi-Rigid Cable

Greeley, J. S.; 30 Jun 04; 9 pp.; In English

Patent Info.: Filed Filed 30 Jun 04; US-Patent-Appl-SN-10-903-534

Report No.(s): PB2007-103797; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A high frequency coax via structure is configured with a stripped semi-rigid cable (no shield), and an inductive compensation loop to mitigate transition discontinuity between that via structure's center conductor and the pad to which the center conductor is connected. The performance of top-to-bottom microwave transitions at high frequencies (e.g., 1 to 12 GHz) for such boards is enhanced. A non-metallized via hole embodiment that is configured with surrounding ground vias provides a greater degree of compensation for connection pads associated with greater capacitance (such as those coupled to a component).

NTIS

High Frequencies; Microwaves; Patent Applications; Waveguides

20070002606 Plevy, Howard, and Dracy, PC, Fort Washington, PA, USA

Chip-Scale Atomic Clock (CSAC) and Method for Making Same

Abeles, J. H.; Braun, A. M.; Chan, W. K.; Kwakernaak, M. H.; Lipp, S. A.; 18 Jul 05; 28 pp.; In English

Contract(s)/Grant(s): DARPA-NBCHC020045

Patent Info.: Filed Filed 18 Jul 05; US-Patent-Appl-SN-11-183-561

Report No.(s): PB2007-103796; No Copyright; Avail.: CASI: [A03](#), Hardcopy

A clock including: a portable, at least partially evacuated housing; a cell being positioned within the housing and including an internal cavity having interior dimensions each less than about 1 millimeter, an intra-cavity pressure of at least about 760 Torr, and containing a metal atomic vapor; an electrical to optical energy converter being positioned within the housing to emit light through the metal atomic vapor; an optical energy intensity detector being positioned within the housing to receive the light emitted by the converter through the metal atomic vapor; at least one conductive winding around the cavity to stabilize the magnetic field experienced in the cavity dependently upon the detector; and, an output to provide a signal from the housing dependently upon the detector detecting the light emitted by the converter through the metal atomic vapor.

NTIS

Atomic Clocks; Patent Applications; Chips (Electronics)

20070002737 Lawrence Livermore National Lab., Livermore, CA USA

Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume

McDonald, J. W.; Kauffman, R. L.; Suter, L. J.; Celeste, J. R.; Schneider, M. B.; Oct. 20, 2005; 18 pp.; In English

Report No.(s): DE2006-885384; UCRL-CONF-216401; No Copyright; Avail.: National Technical Information Service (NTIS)

Summary: Results from the hard x-ray Instruments fielded at NIF in recent shot campaign are discussed (Filter Fluorescer Experiment (FFLEX), 10 keV x-ray Imager (HXRI)); Data in the form of Hard x-ray spectra and images were collected from these instruments (X-ray spectra from 18 to 120 keV, Hard x-ray (approx. 10keV) imaging through 5 micro m gold hohlraum wall).

NTIS

Hohlraums; Imaging Techniques; Spectroscopy; X Ray Imagery; X Rays

20070002753 Lawrence Livermore National Lab., Livermore, CA USA

Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions

Agvaanluvsan, U.; Alpizar-Vicente, A.; Becker, J. A.; Becvar, F.; Bredeweg, T. A.; Oct. 06, 2005; 16 pp.; In English

Report No.(s): DE2006-885366; UCRL-PROC-215969; No Copyright; Avail.: National Technical Information Service (NTIS)

Neutron capture for incident neutron energies ~ 1 eV up to 100 keV has been measured for (sup 151,153)Eu targets. The highly efficient DANCE (Detector for Advanced Neutron Capture Experiments) array coupled with the intense neutron beam at Los Alamos Neutron Science Center is used for the experiment. Stable Eu isotopes mass separated and electroplated on Be backings were used. Properties of well-resolved, strong resonances in two Eu nuclei are examined. The parameters for most of these resonances are known. Detailed multiplicity information for each resonance is obtained employing the high granularity of the DANCE array. The radiative decay cascades corresponding to each resonance are obtained in the experiment. The measurements are compared to simulation of these cascades which calculated with various models for the radiative strength function. Comparison between the experimental data and simulation provides an opportunity to investigate the average quantities.

NTIS

Capture Effect; Neutrons; Nuclear Reactions; Statistical Distributions

20070002756 Idaho Univ., Moscow, ID, USA

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment

Colwell, F. S.; January 2006; 14 pp.; In English

Report No.(s): DE2006-885418; No Copyright; Avail.: National Technical Information Service (NTIS)

Acceptance of monitored natural attenuation (MNA) as a preferred treatment technology saves significant site restoration costs for DOE. However, in order to be accepted MNA requires direct evidence of which processes are responsible for the contaminant loss and also the rates of the contaminant loss. Our proposal aims to: (1) provide evidence for one example of MNA, namely the disappearance of the dissolved trichloroethylene (TCE) from the Snake River Plain aquifer (SRPA) at the Idaho National Laboratory's Test Area North (TAN) site, (2) determine the rates at which aquifer microbes can co-metabolize TCE, and (3) determine whether there are other examples of natural attenuation of chlorinated solvents occurring at DOE sites. To this end, our research has several objectives. First, we have conducted studies to characterize the microbial processes that are likely responsible for the co-metabolic destruction of TCE in the aquifer at TAN (University of Idaho and INL). Second, we are investigating realistic rates of TCE co-metabolism at the low catabolic activities typical of microorganisms existing under aquifer conditions (INL).

NTIS

Containment; Contaminants; Estimates; Liquids; Plumes; Trichloroethylene

20070002768 Ross (Sheridan) PC, Denver, CO, USA

Cysteine Variants of Erythropoietin

Cox, G. N.; 10 Jun 04; 46 pp.; In English

Contract(s)/Grant(s): NIH-1-R43-CA84850; NIH-2-R44-CA84850

Patent Info.: Filed Filed 10 Jun 04; US-Patent-Appl-SN-10-866 580

Report No.(s): PB2007-100866; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The growth hormone supergene family comprises greater than 20 structurally related cytokines and growth factors. A general method is provided for creating site-specific, biologically active conjugates of these proteins. The method involves adding cysteine residues to non-essential regions of the proteins or substituting cysteine residues for non-essential amino acids in the proteins using site-directed mutagenesis and then covalently coupling a cysteine-reactive polymer or other type of cysteine-reactive moiety to the proteins via the added cysteine residue. Disclosed herein are preferred site for adding cysteine residues or introducing cysteine substitutions into the proteins, and the proteins and protein derivatives produced thereby.

NTIS

Patent Applications; Cysteine; Growth; Pituitary Hormones

20070002777 Lawrence Livermore National Lab., Livermore, CA USA

Super-Resolution Algorithms for Nondestructive Evaluation Imaging

Clark, G. A.; Jackson, J. A.; Benson, S. E.; Nov. 18, 2005; 30 pp.; In English

Report No.(s): DE2006-888589; UCRL-CONF-217116; No Copyright; Avail.: National Technical Information Service (NTIS)

;Contents: Problem Definition: Ultrasonic NDE measurements, The spatial resolution problem; Impulse Response Estimation for Enhancing Spatial Resolution: Mitigate ringing due to the transducer and propagation paths; Bandlimited Spectrum Extrapolation for Super-Resolution; Examples of Processing Results.

NTIS

Algorithms; Imaging Techniques; Nondestructive Tests

20070002814 Rutherford Appleton Lab., Chilton, UK

ISIS Annual Report, 2005: Review of the Year

January 2005; 36 pp.; In English

Report No.(s): PB2007-103573; No Copyright; Avail.: National Technical Information Service (NTIS)

ISIS provides world-class facilities for neutron and muon investigations of materials across a diverse range of science disciplines. This part of ISIS 2005 details the work of the facility over the past year, including accounts of science highlights and descriptions of major instrument and accelerator developments, together with progress on the Second Target Station.

NTIS

ISIS Satellites; Muons; Neutrons

20070002816 Brookhaven National Lab., Upton, NY USA

Single Particle Beam Dynamics Design of BSNS/RCS

Wang, S.; Qin, Q.; Fang, S. X.; Tang, J. Y.; Wei, J.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885017; BNL-75475-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Rapid Cycling Synchrotron (RCS) is a key component of Beijing Spallation Neutron Source (BSNS). It accumulates and accelerates protons to design energy of 1.6 GeV, and extracts high energy beam to the target. As a high beam density and high beam power machine, low beam loss is also a basic requirement. An optimal lattice design is essential for the cost and the future operation. The lattice design of BSNS is presented, and the related dynamics issues are discussed. The injection/extraction scheme and the beam collimation system design are introduced.

NTIS

Neutron Sources; Particle Beams; Synchrotrons

20070002817 Brookhaven National Lab., Upton, NY USA

Overview of the SNS Accelerator Mechanical Engineering

Hseuh, H.; Ludwig, H.; Mahler, G.; Pai, C.; Pearson, C.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885016; BNL-75476-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

The Spallation Neutron Source (SNS*) is an accelerator-based neutron source currently nearing completion at Oak Ridge National Laboratory. When completed in 2006, the SNS will provide a 1 GeV, 1.44 MW proton beam to a liquid mercury target for neutron production. SNS is a collaborative effort between six U.S. Department of Energy national laboratories and offered a unique opportunity for the mechanical engineers to work with their peers from across the country. This paper presents an overview of the overall success of the collaboration concentrating on the accelerator ring mechanical engineering along with some discussion regarding the relative merits of such a collaborative approach. Also presented are a status of the mechanical engineering installation and a review of the associated installation costs.

NTIS

Mechanical Engineering; Neutron Sources; Spallation

20070002818 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA, Fermi National Accelerator Lab., Batavia, IL, USA

Recirculating Linac Muon Accelerator for Neutrino Factory

Boagacz, S. A.; Lebedev, V. A.; January 2006; 3 pp.; In English

Report No.(s): DE2006-883855; No Copyright; Avail.: Department of Energy Information Bridge

A conceptual design of a muon acceleration scheme based on recirculating superconducting linacs is proposed. In the presented scenario, acceleration starts after ionization cooling at 210 MeV/c and proceeds to 20 GeV, where the beam is injected into a neutrino factory storage ring. The key technical issues are addressed, such as the choice of acceleration technology (superconducting versus normal conducting) and the choice of RF frequency, and finally, implementation of the overall acceleration scheme: capture, acceleration, transport and preservation of large phase space of fast decaying species. Beam transport issues for large-momentum-spread beams are accommodated by appropriate lattice design choices. The proposed arc optics is further optimized with a sextupole correction to suppress chromatic effects contributing to emittance dilution. The presented proof-of-principle design of the arc optics with horizontal separation of multipass beams is extended for all passes.

NTIS

Industrial Plants; Linear Accelerators; Muons; Neutrinos

20070002824 Princeton Univ., NJ USA

Interpretation of Diamagnetic Signals

Rothman, M. A.; Hooke, W. M.; Aug. 1965; 33 pp.; In English

Contract(s)/Grant(s): AT(30-1)-1238

Report No.(s): PB2007-104979; TM-215; No Copyright; Avail.: CASI: A03, Hardcopy

The 'diamagnetic loop' has proved to be a most valuable diagnostic for observing the heating and cooling of a plasma in a magnetic field. It has been found especially useful in experiments on rf heating performed on B-65, B-66, and on the C stellarator. In these experiments, one cannot assume the equality of $T_{(sub)i}$ and $T_{(sub)e}$, and Doppler shift measurements are not feasible with hydrogen ions. The emf induced in a wire loop by the diamagnetic currents of a plasma gives time-resolved information concerning the perpendicular component of the plasma pressure. In addition, the decay of the signal

following the heating pulse gives a direct measure of the energy decay time. K. Uo has used a diamagnetic loop to measure perpendicular temperature produced by ohmic heating in the C-stellarator and has made a general analysis of the signals observed. In this memo, we present a simpler analysis based on a number of reasonable approximations.

NTIS

Diamagnetism; Plasmas (Physics)

20070002826 Rutherford Appleton Lab., Chilton, UK

ISIS Annual Report, 2005: The Facility

January 2005; 32 pp.; In English

Report No.(s): PB2007-103572; No Copyright; Avail.: National Technical Information Service (NTIS)

ISIS is the world's most successful pulsed neutron and muon source. Over the twenty years since first neutrons were produced, the facility has developed into a major force in condensed matter research and attracted substantial international investment. The facility supports an international community of around 2000 scientists who use neutrons and muons for research across a diverse range of science areas.

NTIS

ISIS Satellites; Muons; Neutrons

20070002864 Lawrence Livermore National Lab., Livermore, CA USA

High Energy Electron Transport in Solids

Snavely, R.; Aglitskii, Y.; Akli, K. U.; Amiranoff, F.; Andersen, C.; Oct. 03, 2005; 24 pp.; In English

Report No.(s): DE2006-885363; UCRL-PROC-215816; No Copyright; Avail.: National Technical Information Service (NTIS)

Summary: Currents are still scaling with increasing intensity; Propagation lengths are appropriate; Reached current densities that require more sophisticated diagnostic; Resistivity may be limiting wire current; Challenge is in understanding the laser-plasma interface region.

NTIS

Electrons; Energy Transfer; High Energy Electrons; Solids

20070002866 Rutherford Appleton Lab., Chilton, UK

CCLRC (Council for the Central Laboratory of the Research Councils) Annual Report and Accounts, 2005-2006

January 2006; 68 pp.; In English

Report No.(s): PB2007-103558; No Copyright; Avail.: CASI: [A04](#), Hardcopy

Throughout 2005-06, the Council continued to trade as a corporate Group (CCLRC Group). The Council's principal activity continued to be the management of its world-class research facilities at Rutherford Appleton Laboratory, the Daresbury Laboratory and the Chilbolton Observatory in accordance with its Charter mission. The Council also continued to fulfil its strategic role on behalf of Research Councils UK, as the national focus for large-scale facilities for neutron scattering, synchrotron radiation and high power lasers. This included the continued management of the UK interests in the Institute Laue Langevin and European Synchrotron Radiation Facility. As well as continuing to operate as a single entity, the Council (CCLRC) has operated its own wholly-owned trading subsidiary, Central Laboratory Innovation and Knowledge Transfer Limited (CLIK). The CCLRC also continued to be the major shareholder in Diamond Light Source Limited (DLS), a Joint Venture established with the Wellcome Trust Limited for the construction and operation of the Diamond facility, a third generation, medium energy synchrotron radiation source. The CCLRC also continued to manage its own conference facility at The Coseners House, Abingdon, Oxon.

NTIS

Synchrotron Radiation; Research and Development

20070002868 Lawrence Livermore National Lab., Livermore, CA USA

Isvector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model

Dimitrova, S. S.; Guerogiev, V. G.; Dukelsky, J.; Pan Isacker, P.; Oct. 13, 2005; 14 pp.; In English

Report No.(s): DE2006-885359; UCRL-PROC-216126; No Copyright; Avail.: National Technical Information Service (NTIS)

Properties of a nucleon system interacting via isovector proton-neutron pairing can be described within the so(5) generalized Richardson-Gaudin exactly-solvable model. We present results for a system of 12 nucleon pairs within the full

$f(\text{sub } p) + g(\text{sub } 9/2)$ shell-model space. We discuss coupling constant dependence of the pair energies, total energy of the system, and the occupation numbers.

NTIS

Models; Nucleon-Nucleon Interactions; Pair Production; Neutrons

20070002873 Brookhaven National Lab., Upton, NY USA, Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006

Sidi-Yekhhlef, A.; Than, R.; Tuozzolo, J.; Ganni, V.; Knudson, P.; January 2006; 12 pp.; In English

Report No.(s): DE2006-885355; No Copyright; Avail.: National Technical Information Service (NTIS)

An ongoing program at Brookhaven National Laboratory (BNL) consists of improving the efficiency of the Relativistic Heavy Ion Collider (RHIC) cryogenic system and reducing its power consumption. Phase I and II of the program addressed plant operational improvements and modifications that resulted in substantial operational cost reduction and improved system reliability and stability, and a compressor input power reduction of 2 MW has been demonstrated. Phase III, now under way, consists of plans for further increasing the efficiency of the plant by adding a load "wet" turbo-expander and its associated heat exchangers at the low temperature end of the plant. This additional stage of cooling at the coldest level will further reduce the required compressor flow and therefore compressor power input. This paper presents the results of the plant characterization, as it is operating presently, as well as the results of the plant simulations of the various planned upgrades for the plant. The immediate upgrade includes the changes associated with the load expander. The subsequent upgrade will involve the resizing of expander 5 and 6 to increase their efficiencies. The paper summarizes the expected improvement in the plant efficiency and the overall reduction in the compressor power.

NTIS

Cryogenics; Refrigerators

20070002881 Brookhaven National Lab., Upton, NY USA

China Spallation Neutron Source Accelerators: Design, Research, and Development

Wei, J.; Fu, S.; Fang, S.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885025; BNL-75480-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

The China Spallation Neutron Source (CSNS) is a newly approved high-power accelerator project based on a H(sup -) linear accelerator and a rapid cycling synchrotron. During the past year, several major revisions were made on the design including the type of the front end, the linac frequency, the transport layout, the ring lattice, and the type of ring components. Here, we discuss the rationale of design revisions, status of the R&D efforts, and upgrade considerations.

NTIS

China; Neutron Sources; Spallation

20070002883 Brookhaven National Lab., Upton, NY USA

Status of Fast IR Orbit Feedback at RHIC

Montag, C.; Cupolo, J.; Glenn, J.; Litvinenko, V.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885024; BNL-75446-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

To compensate modulated beam-beam offsets caused by mechanical vibrations of IR triplet quadrupoles at frequencies around 10 Hz, a fast IR orbit feedback system has been developed. We report design considerations and recent status of the system.

NTIS

Feedback; Atomic Energy Levels

20070002884 Brookhaven National Lab., Upton, NY USA

Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS

Hu, K. H.; Kuo, C. H.; Chou, P. J.; Lee, D.; Hsu, S. Y.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885023; BNL-75467-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Multi-bunch instabilities degrade beam quality through increased beam emittance, energy spread and even beam loss. Feedback systems are used to suppress multi-bunch instabilities associated with the resistive wall of the beam ducts, cavity-like structures, and trapped ions. A new digital transverse bunch-by-bunch feedback system has recently been

commissioned at the Taiwan Light Source, and has replaced the previous analog system. The new system has the advantages that it enlarges the tune acceptance and improves damping for transverse instability at high currents, such that top-up operation is achieved. After a coupled-bunch transverse instability was suppressed, more than 350 mA was successfully stored during preliminary commissioning. In this new system, a single feedback loop simultaneously suppresses both horizontal and vertical multi-bunch instabilities. Investigating the characteristics of the feedback loop and further improving the system performances are the next short-term goals. The feedback system employs the latest generation of field-programmable gate array (FPGA) processor to process bunch signals. Memory has been installed to capture up to 250 msec of bunch oscillation signal, considering system diagnostics suitable to support various beam physics studies.

NTIS

Feedback; Light Sources; Taiwan

20070002886 Rochester Univ., NY USA

Generation and Characterization of Attosecond Pulses

Walmsley, I. A.; Boyd, R. W.; Apr. 2006; 7 pp.; In English

Report No.(s): DE2006-881556; No Copyright; Avail.: Department of Energy Information Bridge

The research undertaken in this project has been directed toward the area of attoscience, in particular the problem of attosecond metrology. That is, the accurate determination of the electric field of attosecond XUV radiation. This outstanding problem has been identified as a critical technology for further development of the field, and our research adds to the area by providing the first method for characterization using the harmonic radiation itself as a tool. The technical effectiveness of this approach is very high, since it is vastly easier to detect XUV radiation directly than the via the spectrum of photoelectrons liberated from atoms by it. This means that the experimental data rate can be much higher in principle using all-optical detection than electron detection, which will greatly aid the utility of harmonic XUV sources in attoscience applications. There are as yet no direct public benefits from this area of scientific research, though access to material structural dynamics on unprecedented brief timescales are expected to yield significant benefits for the future.

NTIS

Metrology; X Rays; Characterization; Pulses

20070002887 Rensselaer Polytechnic Inst., Troy, NY, USA

General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions

Selvaggi, J.; Salon, S.; Kwon, O.; Chari, C. V. K.; Feb. 14, 2006; 14 pp.; In English

Report No.(s): DE2006-881294; No Copyright; Avail.: National Technical Information Service (NTIS)

An alternative method is developed to compute the magnetic field from a circular cylindrical magnetic source. Specifically, a Fourier series expansion whose coefficients are toroidal functions is introduced which yields an alternative to the more familiar spherical harmonic solution or the Elliptic integral solution. This alternate formulation coupled with a method called charge simulation allows one to compute the external magnetic field from an arbitrary magnetic source in terms of a toroidal expansion. This expansion is valid on any finite hypothetical external observation cylinder. In other words, the magnetic scalar potential or the magnetic field intensity is computed on a exterior cylinder which encloses the magnetic source. This method can be used to accurately compute the far field where a finite element formulation is known to be inaccurate.

NTIS

Cylindrical Bodies; Magnetic Fields; Spherical Harmonics

20070002910 Brookhaven National Lab., Upton, NY USA

Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC

Zhang, S. Y.; Ahrens, L.; Alessin, J.; Bai, M.; Blaskiewicz, M.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885019; BNL-75445-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

The large scale application of non-evaporable getter coating in RHIC has been effective in reducing the electron cloud. Since beams with higher intensity and smaller bunch spacing became possible in operation, the emittance growth is of concern. Study results are reported together with experiences of machine improvements: saturated NEG coatings, anti-grazing ridges in warm sections, and the pre-pumping in cryogenic regions.

NTIS

Dynamic Pressure; Electron Clouds; Low Temperature Environments

20070002911 Brookhaven National Lab., Upton, NY USA

Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling

Wang, S.; Wei, J.; Brown, K.; Gardner, C.; Lee, Y. Y.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885018; BNL-75483-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Rapid cycling synchrotrons are used to accelerate high-intensity proton beams to energies of tens of GeV for secondary beam production. After primary beam collision with a target, the secondary beam can be collected, cooled, accelerated or decelerated by ancillary synchrotrons for various applications. In this paper, we first present a lattice for the main synchrotron. This lattice has: (a) flexible momentum compaction to avoid transition and to facilitate RF gymnastics (b) long straight sections for low-loss injection, extraction, and high-efficiency collimation (c) dispersion-free straights to avoid longitudinal-transverse coupling, and (d) momentum cleaning at locations of large dispersion with missing dipoles. Then, we present a lattice for a cooler ring for the secondary beam. The momentum compaction across half of this ring is near zero, while for the other half it is normal. Thus, bad mixing is minimized while good mixing is maintained for stochastic beam cooling.

NTIS

Cooling; Proton Beams; Acceleration (Physics)

20070002912 Lawrence Livermore National Lab., Livermore, CA USA

Proposal for a High Energy Nuclear Database

Brown, D. A.; Vogt, R.; Oct. 13, 2005; 10 pp.; In English

Report No.(s): DE2006-885392; UCRL-PROC-216157; No Copyright; Avail.: Department of Energy Information Bridge

We propose to develop a high-energy heavy-ion experimental database and make it accessible to the scientific community through an on-line interface. This database will be searchable and cross-indexed with relevant publications, including published detector descriptions. Since this database will be a community resource, it requires the high-energy nuclear physics community's financial and manpower support. This database should eventually contain all published data from Bevalac, AGS and SPS to RHIC and LHC energies, proton-proton to nucleus-nucleus collisions as well as other relevant systems, and all measured observables. Such a database would have tremendous scientific payoff as it makes systematic studies easier and allows simpler benchmarking of theoretical models to a broad range of old and new experiments. Furthermore, there is a growing need for compilations of high-energy nuclear data for applications including stockpile stewardship, technology development for inertial confinement fusion and target and source development for upcoming facilities such as the Next Linear Collider. To enhance the utility of this database, we propose periodically performing evaluations of the data and summarizing the results in topical reviews.

NTIS

Data Bases; Nuclear Physics

20070002917 Brookhaven National Lab., Upton, NY USA

Analysis of Availability and Reliability in RHIC Operations

Pilat, F.; Ingrassia, P.; Michnoff, R.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885022; BNL-75486-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

RHIC has been successfully operated for 5 years as a collider for different species, ranging from heavy ions including gold and copper, to polarized protons. We present a critical analysis of reliability data for RHIC that not only identifies the principal factors limiting availability but also evaluates critical choices at design times and assess their impact on present machine performance. RHIC availability data are typical when compared to similar high-energy colliders. The critical analysis of operations data is the basis for studies and plans to improve RHIC machine availability beyond the 50-60% typical of high-energy colliders.

NTIS

Reliability; Accelerators

20070002918 Brookhaven National Lab., Upton, NY USA

Non-Scaling FFAG for Rare Isotopes Production

Ruggiero, A. G.; Roser, T.; Trbojevic, D.; Jun. 2006; 10 pp.; In English

Report No.(s): DE2006-885021; BNL-75469-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

This is a report to demonstrate use of Non-Scaling Fixed-Field Alternating-Gradient (FFAG) accelerators in acceleration of partially stripped ions of Uranium-238 for Rare Isotopes Production. This example assumes a beam final energy of 500

MeV/u with an average beam output current of 1 (micro)A-particle and a beam average power of 120 kWatt.

NTIS

Isotopes; Uranium 238

20070002919 Brookhaven National Lab., Upton, NY USA

RHIC Operational Status and Upgrade Plans

Fischer, W.; Jun. 2006; 12 pp.; In English

Report No.(s): DE2006-885020; No Copyright; Avail.: Department of Energy Information Bridge

Since 2000 RHIC has collided, at 8 energies, 4 combinations of ion species, ranging from gold ions to polarized protons, and including the collisions of deuterons with gold ions. During that time the heavy ion and polarized proton peak luminosities increased by two orders and one order of magnitude respectively. The average proton polarization in store reached 65%. Planned upgrades include the evolution to the Enhanced Design parameters by about 2008, the construction of an Electron Beam Ion Source (EBIS) by 2009, the installation of electron cooling for RHIC II, and the implementation of the electron-ion collider eRHIC. We review the current performance, and the expected performance with these upgrades.

NTIS

Construction; Collisions

20070003152 Air Force Research Lab., Kirkland AFB, NM USA

Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers

Page, William; Schlie, Laverne; Zimmerman, William; Oct 5, 2006; 18 pp.; In English

Contract(s)/Grant(s): DF297074; Proj-4866

Report No.(s): AD-A459041; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459041>; Avail.: CASI: A03,

Hardcopy

A numerical calculation based on Maxwell's equations was made to examine the details of this process. The numerical calculation proceeded from Maxwell's Curl equations and included the treatment of the of the polarization current by means of a non-linear oscillator model. The oscillator is linear for small displacements but becomes non-linear for large fields where the Kerr Effect is important. The oscillator equations of motion determine a non-linear polarization current that is included as a source term in the Maxwell's equation simulation This simulation determines the time dependant dipole moment density of the ionization charge distribution These dipole moments can then be integrated to find the near field and radiation field components of the fields from the standard integrals. The details of these results also show a lower frequency component of the field, but it is still an optical frequency about a factor of 10 lower than the laser frequency. The results do not show the sub terahertz radiation reported in the literature. An interpretation of this is that the measured fields must be very small, coming from second order effects not included.

DTIC

Ionization; Maxwell Equation; Pulsed Lasers

20070003310 Massachusetts Inst. of Tech., Cambridge, MA USA

Reversible Nanoparticle Electronics

Belcher, Angela; Sep 2005; 14 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0336

Report No.(s): AD-A459317; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459317>; Avail.: CASI: A03,

Hardcopy

Phage and yeast both exhibit excellent resiliency to electric field exposure at low currents. The viability of phage and yeast in high voltage fields was tested, opening the door to the exploration of these species as medium for self-repairing electronics applications. Furthermore, survival after high field exposure suggested that electro-spun phage are likely to remain viable, even after they are incorporated into fabrics. Pulsed electric fields were used to successfully and reversibly release a tightly binding peptide from an electrode surface, and subsequently to transfer the peptide to the opposing electrode where the peptide reattached. A bipolar electrode configuration was demonstrated enabling the electric field driven release of biomaterials from a nonconductive surface. Additionally the experiments with yeast on sapphire indicate that under the right conditions the counteracting peptide and yeast surface charges can be overcome, enabling the electrically stimulated release of yeast from a material surface.

DTIC

Electric Fields; Nanoparticles

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*.

20070002915 NASA Langley Research Center, Hampton, VA, USA

Phase Calibration of Microphones by Measurement in the Free-field

Shams, Qamar A.; Bartram, Scott M.; Humphreys, William M.; Zuckewar, Allan J.; [2006]; 5 pp.; In English; INTER-NOISE 2006: 35th International Congress and Exposition on Noise Control Engineering, 3-6 Dec. 2006, Honolulu, HI, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 158.02.08.07

Report No.(s): Paper-767; Copyright; Avail.: CASI: [A01](#), Hardcopy

Over the past several years, significant effort has been expended at NASA Langley developing new Micro-Electro-Mechanical System (MEMS)-based microphone directional array instrumentation for high-frequency aeroacoustic measurements in wind tunnels. This new type of array construction solves two challenges which have limited the widespread use of large channel-count arrays, namely by providing a lower cost-per-channel and a simpler method for mounting microphones in wind tunnels and in field-deployable arrays. The current generation of array instrumentation is capable of extracting accurate noise source location and directivity on a variety of airframe components using sophisticated data reduction algorithms [1-2]. Commercially-available MEMS microphones are condenser-type devices and have some desirable characteristics when compared with conventional condenser-type microphones. The most important advantages of MEMS microphones are their size, price, and power consumption. However, the commercially-available units suffer from certain important shortcomings. Based on experiments with array prototypes, it was found that both the bandwidth and the sound pressure limit of the microphones should be increased significantly to improve the performance and flexibility of the microphone array [3]. It was also desired to modify the packaging to eliminate unwanted Helmholtz resonances exhibited by the commercial devices. Thus, new requirements were defined as follows: Frequency response: 100 Hz to 100 KHz (+/-3dB) Upper sound pressure limit: Design 1: 130 dB SPL (THD less than 5%) Design 2: 150-160 dB SPL (THD less than 5%) Packaging: 3.73 x 6.13 x 1.3 mm can with laser-etched lid. In collaboration with Novusonic Acoustic Innovation, NASA modified a Knowles SiSonic MEMS design to meet these new requirements. Coupled with the design of the enhanced MEMS microphones was the development of a new calibration method for simultaneously obtaining the sensitivity and phase response of the devices over their entire broadband frequency range. Traditionally, electrostatic actuators (EA) have been used to characterize air-condenser microphones; however, MEMS microphones are not adaptable to the EA method due to their construction and very small diaphragm size [4]. Hence a substitution based, free-field method was developed to calibrate these microphones at frequencies up to 80 kHz. The technique relied on the use of a random, ultrasonic broadband centrifugal sound source located in a small anechoic chamber. The free-field sensitivity (voltage per unit sound pressure) was obtained using the procedure outlined in reference 4. Phase calibrations of the MEMS microphones were derived from cross spectral phase comparisons between the reference and test substitution microphones and an adjacent and invariant grazing-incidence 1/8-inch standard microphone. The free-field calibration procedure along with representative sensitivity and phase responses for the new high-frequency MEMS microphones are presented here.

Derived from text

Calibrating; Microphones; Microelectromechanical Systems; Fabrication; Aeroacoustics

20070003012 California Univ., Santa Barbara, CA USA

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry

Eisenhower, Bryan; Hagen, Gregory; Banaszuk, Andrzej; Mezic, Igor; Sep 5, 2006; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-C-0021

Report No.(s): AD-A458815; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458815>; Avail.: CASI: [A03](#), Hardcopy

In this paper, we investigate oscillations of a dynamical system containing passive dynamics driven by a positive feedback and how spatial characteristics (i.e. symmetry) affect the amplitude and stability of its nominal limit cycling response. The physical motivation of this problem is thermoacoustic dynamics in a gas turbine combustor. The spatial domain is periodic (passive annular acoustics) which are driven by heat released from a combustion process, and with sufficient driving through this nonlinear feedback a limit cycle is produced which is exhibited by a traveling acoustic wave around this annulus. We show that this response can be controlled passively by spatial perturbation in the symmetry of acoustic parameters. We find the

critical parameter values that affect this oscillation, study the bifurcation properties, and subsequently use harmonic balance and temporal averaging to characterize periodic solutions and their stability. In all of these cases, we carry a parameter associated with the spatial symmetry of the acoustics and investigate how this symmetry affects the system response. The contribution of this paper is a unique analysis of a particular physical phenomena, as well as illustrating the equivalence of different nonlinear analysis tools for this analysis.

DTIC

Asymmetry; Cycles; Gas Turbines; Nonlinearity; Oscillations; Thermoacoustic Effects

20070003016 Naval Research Lab., Bay Saint Louis, MS USA

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals

Meredith, Roger W; Nagle, Samuel M; Aug 2, 1996; 37 pp.; In English

Report No.(s): AD-A458823; NRL/MR/7174--96-8006; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458823>;

Avail.: CASI: [A03](#), Hardcopy

Different methods for estimating signal coherence from underwater acoustic data taken in shallow water are compared. Specifically this study details methods to estimate coherence from narrow-band, high-frequency, short pulse length, CW signals that typify the signals used by mine hunting sonars in shallow water environments. Due to the short record length of the received pulses, the spectral frequency resolution was poor using classical Fourier techniques. This motivated alternate approaches for the spectral estimation and coherence estimates. The other methods compared are an autoregressive parametric based approach, harmonic wavelet approach, and concatenation of successive pulses followed by the classical method.

DTIC

Continuous Radiation; Narrowband; Shallow Water; Signal Transmission; Sound Waves; Underwater Acoustics

20070003042 Signal Innovations Group, Inc., Durham, NC USA

Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems

Carin, Lawrence; Dasgupta, Nilanjan; Haron, Steven; Nov 29, 2006; 15 pp.; In English

Contract(s)/Grant(s): N00014-06-C-0026

Report No.(s): AD-A458870; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458870>; Avail.: CASI: [A03](#),

Hardcopy

This report summarizes recent progress by Signal Innovations Group (SIG) in supporting the Naval Research Laboratory (NRL) on development of a new low-frequency sonar system. SIG has the tasks of developing the algorithms and transitioning them to NRL, for use in sea tests. The discussion below provides a summary of the following items: (i) a kernel-based matching pursuits classification algorithm, (ii) life-long learning, (iii) in situ learning, and (iv) a discussion of the features used within the algorithms. Items (i) and (iv) are fully transitioned to NRL, and have been employed during sea tests. Items (ii) and (iii) are currently under development by SIG, in cooperation with NRL.

DTIC

Algorithms; Classifications; Color; Low Frequencies; Sonar

20070003060 Massachusetts Inst. of Tech., Cambridge, MA USA

Robust Wavelet Thresholding for Noise Suppression

Schick, I C; Krim, H; Dec 1996; 6 pp.; In English

Contract(s)/Grant(s): DAAL03-92-G-115; F49620-95-1-0083

Report No.(s): AD-A458897; LIDS-P-2375; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458897>; Avail.:

CASI: [A02](#), Hardcopy

Approaches to wavelet-based denoising (or signal enhancement) have so far relied on the assumption of normally distributed perturbations. To relax this assumption, which is often violated in practice, we derive a robust wavelet thresholding technique based on the Minimax Description Length principle. We first determine the least favorable distribution in the epsilon-contaminated normal family as the member that maximizes the entropy. We show that this distribution and the best estimate based upon it, namely the Maximum Likelihood Estimate constitute a saddle point. This results in a threshold that is more resistant to heavy-tailed noise, but for which the estimation error is still potentially unbounded. We address the practical case where the underlying signal is known to be bounded, and derive a two-sided thresholding technique that is resistant to outliers and has bounded error. We provide illustrative examples.

DTIC

Noise Reduction; Wavelet Analysis

20070003159 Idaho Univ., Moscow, ID USA

Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller

Baker, Bradley N; Anderson, Michael J; Bean, Thomas A; Edwards, Dean B; Odell, Douglas L; Jan 2005; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-05-1-0674

Report No.(s): AD-A459052; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459052>; Avail.: CASI: [A02](#), Hardcopy

De-centralized formation control is one way to enable the function of multiple Autonomous Underwater Vehicles (AUVs). It is thought that decentralization can lower the requirements on communication for control, and formation-flying would simplify the oversight of large numbers of vehicles operating simultaneously. In this paper, we describe an algorithm that would enable multiple vehicles to maintain formation. Follower vehicles are equipped with a sensor that can determine a relative angular heading to the source of an intercepted acoustic signal from a leader vehicle. This sensor consists of two hydrophones separated by a fixed distance on the follower vehicles. Experiments were conducted to assess the ability of the two-hydrophone sensor to determine bearing angle in the presence of propeller noise, relative motion with consequent Doppler shift, and a test application in a formation-flying scenario. The effect of using cross-correlation and matched filter signal processing procedures for determination of bearing angle were also compared. It was found that the two-hydrophone sensor could determine bearing angle in the presence of propeller noise, over distances ranging from 9-400m considered in the experiments to an accuracy of approximately 4°. Higher accuracy in bearing angle determination was obtained with matched filter than with cross-correlation signal processing, in spite of relative motion.

DTIC

Controllers; Formation Flying; Hydrophones; Underwater Vehicles

20070003185 Naval Research Lab., Washington, DC USA

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions

Howarth, Thomas R; Apr 1999; 12 pp.; In English

Report No.(s): AD-A459091; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459091>; Avail.: CASI: [A03](#), Hardcopy

For acoustic identification of objects in a littoral environment, there are generally three frequency bands of interest; 1 kHz to 10 kHz, 10 kHz to 100 kHz and 100 kHz to 1 MHz, where the selection of these bands is dependent upon the specific Navy mission. This paper will discuss the progress of the Naval Research Laboratory in developing acoustic projector prototypes to address the lower two frequency bands for unmanned underwater vehicle (UUV) and/or autonomous underwater vehicle (AUV) applications. The band of 1 kHz to 10 kHz is currently being addressed using cymbal flexensional vibrator elements sandwiched into thin panels. In-air data has shown that high levels of acoustic displacement at low frequencies are possible with these devices while more recent in-water data has verified these expectations. This success has led to modelling and prototyping of similar devices for shallow water regions. The frequency range of 10 kHz to 100 kHz has been investigated for several years where the acoustic projector was originally reported during AeroSense 1998. The results of integrating the NRL broadband projector into the NSWC/Coastal Systems Station (CSS) synthetic aperture sonar (SAS) UUV will be presented. This system integration considers the projector as a constant source level over the 10 kHz to 100 kHz band by driving the 100 kHz resonant transducer with an inversely shaped transformer. The presentation will conclude with a discussion of the future development trends in shallow water transducers for AUV and UUV missions.

DTIC

Acoustics; Shallow Water; Signal Detectors; Sonar; Sound Generators; Underwater Vehicles

20070003449 Massachusetts Inst. of Tech., Cambridge, MA USA

Active Control of Blade Tonals in Underwater Vehicles

Annaswamy, Anuradha M; Dec 2006; 21 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0777

Report No.(s): AD-A459690; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The goal of this proposal is to achieve stealth through the reduction or alteration of radiated noise that produce blade tonals in underwater vehicles. The use of active control that is judiciously integrated with passive control is proposed to realize which consists of intentional articulation of suitable surfaces or boundary conditions in the vehicle so as to modify the relevant noise characteristics. By modulating additional surfaces, biological organisms appear to affect lift, drag, and related wake producing features, a combination of which may lead to a modification of the underlying acoustic characteristics. Our thesis is that by distilling some of the fundamental features of these mechanisms, and suitably accommodating them in underwater

vehicles, significant changes in the noise production can be made by expending very little energy. By modulating suitable foils and components as a function of the flow-field around the vehicle at appropriate spatial locations and time-scales, the goal is to achieve significant change in the gust amplitudes and resulting noise production. The aim of this proposal is therefore to determine active biomimetic control methods for reducing/altering blade tonal signatures.

DTIC

Active Control; Adaptive Control; Propeller Blades; Underwater Acoustics; Underwater Vehicles

72

ATOMIC AND MOLECULAR PHYSICS

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see 73 *Nuclear Physics*.

20070003318 Yale Univ., New Haven, CT USA

Spin Decoherence Measurements for Solid State Qubits

Barrett, Sean E; Jul 2005; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0507

Report No.(s): AD-A459337; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459337>; Avail.: CASI: A03,

Hardcopy

This project set out to measure and to understand the decoherence times of nuclear spins in semiconductors, to assess their potential as qubits in solid state quantum computer architectures. Our initial goal was to characterize P-31 nuclei in Silicon doped with Phosphorous (Si:P). While working towards this goal, we unexpectedly discovered an important discrepancy with the conventional theory of NMR. Specifically, well-known multiple Pi pulse spin echo experiments had the ability either to freeze out or to accelerate the signal decay expected due to the spin-spin dipolar coupling, reminiscent of the quantum Zeno effect. This result has now been seen in many nuclei (e.g., Si-29, C-13, Y-89, H-1) in different samples (including Silicon and buckyballs), and it is a robust phenomenon. This was probably always present, just not recognized, in magnetic resonance experiments. It appears to be a many-body effect arising from the tiny spin-spin interactions acting during strong, but finite, control pulses. Understanding this puzzle is essential, because it is likely to be relevant to most physical qubits (not just spins) driven by 'bang-bang' control sequences, or other control pulse sequences.

DTIC

Nuclear Magnetic Resonance; Solid State

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*.

20070002741 Lawrence Livermore National Lab., Livermore, CA USA

Report on the Performance of a Large-Area, Gamma-Ray Imager for Search

Fabris, L.; Ziock, K. P.; Oct. 19, 2005; 12 pp.; In English

Report No.(s): DE2006-885378; UCRL-TR-216328; No Copyright; Avail.: National Technical Information Service (NTIS)

We are currently constructing a prototype, large-area, gamma-ray detector for conducting vehicle-mounted, mobile-search operations. The system is unique in that it relies on imaging to discriminate point sources of interest from the natural background variations. In a non-imaging instrument the background fluctuations mimic the signature seen from real sources at a distance and one is limited in sensitivity to detecting only those sources that overwhelm the local background variations --not just the counting statistics associated with a given measurement. The net result is that a larger detector is generally not more sensitive to detecting sources in the world at large. In a previous publication we reported on the detection of a 1-mCi source at more than 80 meters from the detector using a proof-of-principle instrument constructed to demonstrate how imaging removes the size limit on search instruments. In this report we document a systematic effort using the same detector to demonstrate that imaging detectors can reliably detect weak radiation sources at many 10's of meters. Specifically, we collected data on a 1-mCi (sup 137)Cs source 65 m from the path of the search instrument.

NTIS

Gamma Rays; Radiation Sources

20070002749 Lawrence Livermore National Lab., Livermore, CA USA

Soft Radiative Strength in Warm Nuclei

Schiller, A.; Voinov, A.; Agvaanluvsan, U.; Algin, E.; Becker, J.; Oct. 06, 2005; 22 pp.; In English

Report No.(s): DE2006-885370; UCRL-PROC-215983; No Copyright; Avail.: Department of Energy Information Bridge

We present data on the soft ($E(\text{sub } \gamma) \approx 3-4 \text{ MeV}$) radiative strength function (RSF) for electromagnetic transitions between warm states (i.e. states several MeV above the yrast line) from two different types of experiments. The Oslo method provides data on the total level density and the sum (over all multipolarities) of all RSFs by sequential extraction from primary-(γ) spectra. Measurements of two-step-decay spectra following neutron capture yields two-step-cascade (TSC) intensities which are roughly proportional to the product of two RSFs. Investigations on (^{172}Yb) and (^{57}Fe) have produced unexpected results. In the first case, a strong ($B(M1 \uparrow) = 6.5 (\mu\text{N})^2$) resonance at $E = 3.3 \text{ MeV}$ was identified. In the second case, a large (more than a factor of 10) enhancement compared to theoretical estimates of the very soft ($E(\text{sub } \gamma) \approx 3 \text{ MeV}$), summed RSF for transitions between warm states was observed. A somewhat weaker (factor (approx) 3) enhancement of the RSF in Mo isotopes observed within the Oslo method still awaits confirmation from TSC experiments.

NTIS

Nuclei; Nuclear Radiation

20070002779 Lawrence Livermore National Lab., Livermore, CA USA

Innovative Fission Measurements with a Time Projection Chamber

Heffner, M. D.; Barnes, P. D.; Klay, J. L.; Dec. 07, 2005; 46 pp.; In English

Report No.(s): DE2006-888587; No Copyright; Avail.: National Technical Information Service (NTIS)

This study explores a pioneering idea to utilize a Time Projection Chamber (TPC) to measure fission cross sections and other fission quantities. The TPC is inherently capable of measuring fragments from fission events, decay alphas, and beam-material scatters. This document explores whether the TPC can improve the precision of the ($^{239}\text{Pu}(n,f)$) cross section and measure other new and significant fission quantities simultaneously. This work shows that the TPC can in fact deliver sub-1% cross section measurements and should provide breakthroughs in both the quality and quantity of information available from neutron-induced fission experiments.

NTIS

Fission; Research Facilities

20070003023 Library of Congress, Washington, DC USA

Nuclear Fuel Reprocessing: U.S. Policy Development

Andrews, Anthony; Nov 29, 2006; 7 pp.; In English

Report No.(s): AD-A458841; CRS-RS22542; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458841>; Avail.:

CASI: [A02](#), Hardcopy

As part of the World War II effort to develop the atomic bomb, reprocessing technology was developed to chemically separate and recover fissionable plutonium from irradiated nuclear fuel. In the early stage of commercial nuclear power, reprocessing was thought essential to supplying nuclear fuel. Federally sponsored breeder reactor development included research into advanced reprocessing technology. Several commercial interests in reprocessing foundered due to economic, technical, and regulatory issues. President Carter terminated federal support for reprocessing in an attempt to limit the proliferation of nuclear weapons material. Reprocessing for nuclear weapons production ceased shortly after the Cold War ended. The Department of Energy now proposes a new generation of 'proliferation-resistant' reactor and reprocessing technology.

DTIC

Fissionable Materials; Nuclear Fuels; Policies; Reclamation

20070003095 Rochester Univ., NY USA

Polarized Single-Photons on Demand - A New Source for Quantum Information

Lukishova, Svetlana G; Boyd, Robert W; Stroud, Carlos R; Jan 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0285

Report No.(s): AD-A458945; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458945>; Avail.: CASI: [A03](#),

Hardcopy

The goal of this project is the development of an efficient source, operating at room temperature, of deterministically

polarized single photons on demand for quantum information. Our main results are as follows: (1) first demonstration of emitter fluorescence antibunching in liquid crystal hosts; (2) first demonstration of a definite polarization in fluorescence from single emitters (dye molecules) at room temperature both in oligomeric and monomeric planar-aligned nematic liquid crystals; (3) avoiding dye bleaching during more than one hour of cw, 532-nm excitation by special host treatment; (4) first single-dyemolecule/ single semiconductor colloidal quantum dot fluorescence imaging in 1-D photonic bandgap chiral nematic liquid crystals; (5) current single-photon source on demand efficiency using pulsed laser excitation of 1-D photonic bandgap doped liquid crystal structure is ~ 10%. We have published 18 journal papers, submitted one patent application, delivered 30 conference and meeting presentations with six invited presentations among them.

DTIC

Photons; Quantum Theory

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*.

20070002142 NASA Marshall Space Flight Center, Huntsville, AL, USA

Mirror Technology Roadmap

Stahl, H. Phil; [2006]; 1 pp.; In English; *Frontiers in Optics 2006: The 90th OSA Annual Meeting, 8-12 Oct. 2006, Rochester, NY, USA*; No Copyright; Avail.: Other Sources; Abstract Only

NASA's Mirror Technology Roadmap identifies specific capabilities requiring significant advances in optical fabrication and testing to enable the next generation of large-aperture space telescopes for astronomy and Earth science missions ranging from x-ray to infrared.

Author

Mirrors; Fabrication; X Rays; Infrared Radiation; Earth Sciences

20070002488 NASA Marshall Space Flight Center, Huntsville, AL, USA

Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels

Gubarev, Mikhail; Ramsey, Brian; Engelhaupt, Darell; [2006]; 1 pp.; In English; *NASA Mirror Technology Days in the Government, 17-20 Sep. 2006, Albuquerque, NM, USA*; No Copyright; Avail.: Other Sources; Abstract Only

Grinding and mechanical polishing techniques used for x-ray optics mandrel figuring lead to mid-frequency surface ripple. These small figure variations have to be addressed in order to improve the performance of the resulting x-ray mirrors. If the electrochemical etching is combined with mechanical polishing, the figuring and the surface finishing can be done simultaneously and be used to correct the mid-frequency surface ripple. It is shown that the electrochemical mechanical polishing method allows selective removal of nickel alloy without mandrel surface microroughness degradation.

Author

Surface Finishing; Mirrors; Electropolishing; X Ray Optics; Nickel Alloys

20070002526 NASA Ames Research Center, Moffett Field, CA, USA

Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials

Goorjian, Peter M.; Agrawal, Govind, P.; 1997; 1 pp.; In English; *Optical Society of America 1997 Annual Meeting, October 12-17, 1997, Long Beach, CA, USA*; No Copyright; Avail.: Other Sources; Abstract Only

An algorithm has been developed that solves the semiconductor Maxwell-Bloch equations, without making the standard slowly-varying envelope (SVEA) and rotating-wave (RWA) approximations. It is applied to study the propagation of ultrashort pulses in semiconductor materials. The results include many-body effects due to the Coulomb interaction among the charge carriers as well as the nonlinear effects resulting from spectral hole-burning.

Author

Maxwell Equation; Algorithms; Semiconductors (Materials); Many Body Problem; Charge Carriers

20070002562 Lawrence Livermore National Lab., Livermore, CA USA

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense

Meir, W.; Bibeau, C.; Oct. 28, 2005; 112 pp.; In English

Report No.(s): DE2006-889971; UCRL-TR-216659; No Copyright; Avail.: National Technical Information Service (NTIS)

The High Average Power Laser Program (HAPL) is a multi-institutional, synergistic effort to develop inertial fusion energy (IFE). This program is building a physics and technology base to complement the laser-fusion science being pursued by DOE Defense programs in support of Stockpile Stewardship. The primary institutions responsible for overseeing and coordinating the research activities are the Naval Research Laboratory (NRL) and Lawrence Livermore National Laboratory (LLNL). The current LLNL proposal is a companion document to the one submitted by NRL, for which the driver development element is focused on the krypton fluoride excimer laser option. The NRL and LLNL proposals also jointly pursue complementary activities with the associated rep-rated laser technologies relating to target fabrication, target injection, final optics, fusion chamber, target physics, materials and power plant economics. This proposal requests continued funding in FY03 to support LLNL in its program to build a 1 kW, 100 J, diode-pumped, crystalline laser, as well as research into high gain fusion target design, fusion chamber issues, and survivability of the final optic element. These technologies are crucial to the feasibility of inertial fusion energy power plants and also have relevance in rep-rated stewardship experiments.

NTIS

Delivery; Diodes; High Power Lasers; Laser Materials; Project Planning; Solid State Lasers

20070002596 Schwegman, Lundberg, Woessner and Kluth, P.A., Minneapolis, MN, USA

Optically Controlled Photonic Switch

de Almelda, V. R.; Barrios, C. A.; Panepucci, R. R.; Lipson, M.; 25 May 05; 9 pp.; In English

Patent Info.: Filed Filed 25 May 05; US-Patent-Appl-SN-11-137-126

Report No.(s): PB2007-103803; No Copyright; Avail.: CASI: [A02](#), Hardcopy

Fast, all optical switching of light is provided on silicon, using highly light confining structures to enhance the sensitivity of light to small changes in refractive index. In one embodiment, the light confining structures are silicon micrometer-size planar ring resonators which operate with low pump light pulse energies.

NTIS

Optical Switching; Patent Applications; Photonics

20070002600 nLight Photomics Corp., Vancouver, WA, USA

Semiconductor Lasers with Hybrid Materials Systems

Farmer, J. N.; DeVito, M. A.; Huang, Z.; Crump, P. A.; Thiagarajan, P.; 27 Jul 04; 10 pp.; In English

Contract(s)/Grant(s): DARPA-MDA972-03-C-0101

Patent Info.: Filed Filed 27 Jul 04; US-Patent-Appl-SN-10-902-224

Report No.(s): PB2007-103801; No Copyright; Avail.: CASI: [A02](#), Hardcopy

A semiconductor laser and a method of forming the same are provided. The semiconductor laser includes cladding layers comprised of hybrid materials systems which have different conduction to valance band gap offset ratios with respect to GaAs. As a result of these hybrid structures, lower junction voltages on both the n-side and p-side of the laser structure are achieved, thereby increasing the electrical to optical conversion efficiency of the laser.

NTIS

Patent Applications; Semiconductor Lasers; Hybrid Structures

20070002618 NASA Marshall Space Flight Center, Huntsville, AL, USA

Optical Coatings and Surfaces in Space: MISSE

Stewart, Alan F.; Finckenor, Miria M.; [2006]; 40 pp.; In English; Bolder Damage Symposium, 25-27 Sep. 2006, Boulder, CO, USA; Original contains black and white illustrations

Contract(s)/Grant(s): WBS 994.05.02.01.08.01; Copyright; Avail.: CASI: [A03](#), Hardcopy

The space environment presents some unique problems for optics. Components must be designed to survive variations in temperature, exposure to ultraviolet, particle radiation, atomic oxygen and contamination from the immediate environment. To determine the importance of these phenomena, a series of passive exposure experiments have been conducted which included, among others, the Long Duration Exposure Facility (LDEF, 1985- 1990), the Passive Optical Sample Assembly

(POSA, 1996- 1997) and most recently, the Materials on the International Space Station Experiment (MISSE, 2001 - 2005). The MISSE program benefited greatly from past experience so that at the conclusion of this 4 year mission, samples which remained intact were in remarkable condition. This study will review data from different aspects of this experiment with emphasis on optical properties and performance.

Author

Aerospace Environments; Optical Properties; Ultraviolet Radiation; Exposure; Antireflection Coatings; Oxygen Atoms; Radiation Dosage

20070002708 National Inst. of Information and Communications Technology, Tokyo, Japan

Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2

Kurihara, Noriyuki, Editor; Tawara, Yasuo, Editor; Okano, Naoki, Editor; Wakana, Hiromitsu, Editor; Naruse, Makoto, Editor; June 2006; ISSN 1349-3205; 142 pp.; In English; See also 20070002709 - 20070002724; Original contains black and white illustrations; Copyright; Avail.: Other Sources

This Special Issue on Photonic Networks provides a summary of the recent achievements of research conducted by the National Institute of Information and Communications Technology, or NICT, in relation to the fundamental technologies of optical communication. In terms of the overall organization of this issue, we are honored to begin with a review on international trends in research and development contributed by Dr. Kenichi Kitayama, Professor of the Graduate School of Osaka University. Starting from Chapter 3, research papers are divided into four sections by technical field and arranged under categories ranging, in order, from constituent technologies to subsystem technologies to network technologies. Specifically, Chapter 3 is entitled Physical Layer Implementation Technology/Optical Signal Processing, Chapter 4 presents Wavelength Routing/Optical Burst/Access Systems, Chapter 5 deals with Packet Switching, and Chapter 6 is entitled Interoperability. Although NICT is involved in two different types of research and development activities in the field of optical communication-independent research and commissioned research-in this special issue these papers are arranged by content, without distinguishing between the type of research and development involved. The aim of this structure is to allow for a technically comprehensible layout that will enable readers to easily review the entire journal.

Derived from text

Optical Communication; Photonics; Communication Networks; Technology Utilization; Information Systems

20070002709 Nippon Electric Co. Ltd., Japan

Research and Development of High-Capacity Optical Link Technologies

Fukuchi, Kiyoshi; Ito, Toshiharu; Hatakeyama, Ichiro; Kurata, Kazuhiko; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 37-44; In English; See also 20070002708; Copyright; Avail.: Other Sources

In order to accommodate the explosively increasing Internet traffic into trunk optical fiber network, there are several issues to be solved, such as effective transmission over long distance with high capacity data stream, and small-sized/low-power LSI interface for high capacity traffic routing chip. In this paper we demonstrate our developed ultra-dense WDM technology and transmission line design to enable 10 Tbps and/or thousand-wavelength WDM long-haul transmission system. Result of switch LSI module development with very small optical interfaces is also summarized that will enable very high capacity optical interconnection.

Author

Optical Fibers; Large Scale Integration; Data Flow Analysis; Switches; Transmission Lines

20070002710 National Inst. of Information and Communications Technology, Tokyo, Japan

Studies on Architecture and Control Technology for Optical Packet Switches

Harai, Hiroaki; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 117-125; In English; See also 20070002708; Copyright; Avail.: Other Sources

In this paper, we first describe overview and advanced technology of optical packet switches (OPS) and requirements for practical use of OPS of which target is the internet and 10 Tbps throughput. Then, we report switch architecture, recent activities of integrated technology and electronic control systems for OPS.

Author

Electronic Control; Switches; Packet Switching

20070002711 National Inst. of Information and Communications Technology, Tokyo, Japan

Emerging Techniques to Enable Asynchronous Coherent OCDMA

Wang, Xu; Kitayama, Ken-ichi; Wada, Naoya; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 15-25; In English; See also 20070002708; Copyright; Avail.: Other Sources

In this paper, we review the recent progress in the key enabling techniques for asynchronous coherent OCDMA; the novel encoder/decoders including spatial lightwave phase modulator, micro-ring resonator for spectral phase coding and superstructured FBG (SSFBG) and AWG type encode/decoder for time-spreading coding; optical thresholding techniques with PPLN and nonlinearity in fiber. The FEC has also been applied in OCDMA system recently. Most recently, we have demonstrated a record throughput 12 x 10.71 Gbps truly-asynchronous OCDMA system by using the 16 x 16 ports AWG-type encoder/decoder and FEC transmit ITU-T G. 709 OTN frames.

Author

Code Division Multiple Access; Optical Communication; Coherent Radiation; Asynchronous Transfer Mode

20070002712 National Inst. of Information and Communications Technology, Tokyo, Japan

Advanced Optical Modulators for Next-generation Photonic Networks

Kawanishi, Tetsuya; Sakamoto, Takahide; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 53-59; In English; See also 20070002708; Copyright; Avail.: Other Sources

This article describes recent research activities using an NICT novel optical device, the optical frequency-shift-keying (FSK) modulator, which can provide high-speed control of optical frequency, phase and amplitude. The FSK modulator can generate various types of high-speed optical signals, precisely. We show a couple of examples of recent results on applications of the FSK modulator for next-generation optical communications systems, such as optical FSK label processing, tunable optical buffer techniques, high speed differential quadrature-phase-shift-keying (DQPSK) signal generation for 100 GbE and continuous-phase FSK signal generation for dense wavelength-domain-multiplexing.

Author

Modulators; Optical Equipment; Photonics; Optical Communication; Frequency Shift Keying

20070002713 National Inst. of Information and Communications Technology, Tokyo, Japan

OCDM Transmission Experiments on JGNII Test bed Optical Link

Kamio, Yukiyoshi; Kubota, Fumito; Minato, Naoki; Kobayashi, Shuko; Ushikubo, Takashi; Wada, Naoya; Kutsuzawa, Satoko; Sasaki, Kensuke; Nishiki, Akihiko; Kamijoh, Takeshi; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 71-78; In English; See also 20070002708; Copyright; Avail.: Other Sources

Optical code division multiplexing (OCDM) is a promising technology for photonic packet switching and the optical metro- and local-area-networks (MAN/LAN) system applications, due to its all optical signal processing, flexible capacity, and highly secures transmission. We have proposed and developed, time-spread/wavelength hopping systems utilizing fiber-Bragg-grating (FBG) filters. We report field trial of 20 km transmission on time-spread/wavelength-hopping (OCDM) was achieved using FBG en/decoders with 10 GbpsX2-ch signals on the JGNII network.

Author

Code Division Multiplexing; Packet Switching; Optical Data Processing; Local Area Networks; Bragg Gratings

20070002714 National Inst. of Information and Communications Technology, Tokyo, Japan

A Study for Technology of Controlling Next-Generation Backbone Network

Otsuki, Hideki; Morioka, Toshio; Arai, Nahoko; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 127-132; In English; See also 20070002708; Copyright; Avail.: Other Sources

It is strongly required from both viewpoints of reducing operation cost and advanced network functionality, to achieve a technology to control kinds of network equipments by single protocol set. For development of wavelength division multiplex network, as next generation optical network, it is expected to be in practical use the GMPLS technology to control optical paths. NiCT is investigating to realize a global inter-operability of GMPLS in Kei-Han-Na Info-Communication Open Laboratory, collaborating with industry, academia and government and aiming to lead international standardization, furthermore, to achieve a wide area field test bed for GMPLS network utilizing JGN II.

Author

Optical Paths; Multiplexing; Protocol (Computers); Computer Networks

20070002715 Osaka Univ., Japan

Polarization-mode Dispersion and its Mitigation

Matsumoto, Masayuki; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 45-52; In English; See also 20070002708; Copyright; Avail.: Other Sources

Polarization-mode dispersion (PMD) is one of the major factors limiting the performance of high-speed optical fiber transmission systems. This review paper describes basic mathematics and features of PMD, statistical properties of PMD of some installed systems, and principles of proposed methods of PMD mitigation.

Author

Optical Fibers; Statistical Distributions; High Speed; Polarization; Dispersion

20070002716 Nippon Telegraph and Telephone Public Corp., Japan

Experiments of a Terabit-Class Super-Network

Naruse, Yuuichi; Nishioka, Itaru; Kodama, Takeshi; Yagi, Takeshi; Kano, Shinya; Okita, Hideki; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 95-100; In English; See also 20070002708; Copyright; Avail.: Other Sources

We propose the cooperative multi-layered traffic engineered technologies. Our technologies are designed to achieve the scalability goal of the 'e-Japan Strategy' of the Ministry of Internal Affairs and Communications in which a terabit-class network can accommodate about 40 million broadband users. We report the experiments of the Terabit class Super-network using prototype systems.

Author

Computer Networks; Broadband; Prototypes; Optical Control; Paths

20070002717 National Inst. of Information and Communications Technology, Tokyo, Japan

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing

Miyazaki, Tetsuya; Naruse, Makoto; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 61-69; In English; See also 20070002708; Copyright; Avail.: Other Sources

Highly efficient optical communication technologies are becoming important since the conventional strategies, such as denser wavelength multiplexing or higher time-domain multiplexing, are approaching their physical limits. Power-efficiency and volume-efficiency are additional important demands required in optical communications. In this paper, we show our recent development in high-efficient optical communications such as multi-level transmission technologies and high-density optical signal processing performed in a scale smaller than the diffraction limit of light.

Author

Light Transmission; Optical Communication; Signal Processing; Technology Utilization; Optical Data Processing

20070002718 National Inst. of Information and Communications Technology, Tokyo, Japan

Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies

Wada, Naoya; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 107-116; In English; See also 20070002708; Copyright; Avail.: Other Sources

We have developed optical packet switch (OPS) prototype with optical code label processing, optical switching, optical buffering, and electronic scheduling to improve drastically the switching performance of optical packets in photonic network nodes. 160 Gbit/s/port OPS prototype is developed by introduction of 25 Gchip/s narrow-band optical code label processing and optical buffering with noise reduction function. A novel packet bit error rate (BER) and loss real-time measurement method and system for 40 Gbit/s variable-length packets has been proposed. Packet BER and loss real-time measurement with various conditions is experimentally demonstrated by using proposed measurement system and OPS system. By using the proposed system, only the payload data part of packet and burst data, which varies in interval time and packet length, is evaluated. Packet BER and loss real-time measurement with 160 Gbit/s variable-length OPS, OTDM-MUX/DEMUX, and 10 Gbit/s preamble free optical packet 3R receiver are experimentally demonstrated. Finally, integral demonstration by using 160 Gbit/s/port OPS prototype with optical buffer, packet BER evaluation system, and OTDM-MUX/DEMUX system with 160 Gbit/s and 10 Gbit/s light signal is reported.

Author

Optical Switching; Packet Switching; Prototypes; Research and Development; Technology Utilization; Photonics

20070002719 National Inst. of Information and Communications Technology, Tokyo, Japan

Advanced Lightpath Establishment for Distributed Computing

Tachibana, Takuji; Xu, Surgang; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 101-106; In English; See also 20070002708; Copyright; Avail.: Other Sources

Currently, it is expected that distributed computing environment is developed in wide-area networks by using wavelength division multiplexing (WDM) and lightpath witching. In this paper, in order to develop the distributed computing environment over lightpath switching networks, we study two new lightpath establishment approaches. These two approaches enable lightpaths to be effectively established in wide-area WDM networks and enable optical ring to be dynamically developed for the data transmission in multiple points.

Author

Data Transmission; Wavelength Division Multiplexing; Wide Area Networks; Switching

20070002720 Oki Electric Industry Ltd., Tokyo, Japan

EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission

Murai, Hitoshi; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 27-35; In English; See also 20070002708; Copyright; Avail.: Other Sources

Ultra high-speed signal transmission at a bit rate of 160 Gb/s is one of the key technologies to construct next generation ultra high-capacity optical network. In the 'Research and Development on Ultrahigh-speed Backbone Photonic Network Technologies' project, promoted by NICT, we have developed 160 Gb/s optical multiplexing/demultiplexing techniques with a capability for practical use. In this report, we describe the overview of the 160 Gb/s OTDM technologies based on EA modulators, and we also discuss the applicability of the OTDM techniques to real system, reviewing 160 Gb/s field transmission experiment on JNII optical testbed.

Author

Signal Transmission; Multiplexing; Demultiplexing; Modulators

20070002721 Osaka Univ., Japan

R&D Activities of Photonic Networks in the World

Kitayama, Kenichi; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 3-8; In English; See also 20070002708; Copyright; Avail.: Other Sources

With full-scale development of broadband services, a future-proof 21st-century network, which is based upon innovative photonic network technologies, has to be built to cope with the rapid growth of IP traffic. In this paper, R&D programs supported by national institutes in Japan, USA, and European Union are introduced.

Author

Research and Development; Broadband; Proving; Photonics; Networks

20070002722 National Inst. of Information and Communications Technology, Tokyo, Japan

Optical Signal Processing using Fiber Nonlinearity

Abedin, Kazi Sarwar; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 9-14; In English; See also 20070002708; Copyright; Avail.: Other Sources

We demonstrate compact high-repetition rate picosecond/femtosecond pulse sources, wavelength converters using nonlinear pulse shaping and ultrafast pulse retimers that are based on nonlinear effect in optical fibers. We generated picosecond pulses at a 40-GHz repetition rate from a laser that employs photonic crystal fiber for reducing the cavity length. Furthermore, we produce 10-GHz femtosecond solitons, tunable over a 90-nm range, by means of soliton self-frequency shift of the mode-locked laser pulses in a 12.6-m-long PCF. Finally, retiming of signal pulses by orthogonally polarized control pulses co-propagating using a polarization-maintaining fiber is also demonstrated.

Author

Optical Fibers; Picosecond Pulses; Pulsed Lasers; Nonlinearity; Optical Data Processing

20070002723 Tokyo Univ., Japan

Experimental Study of a Burst-Switched WDM Network Testbed

Sun, Yongmei; Minh, Vu Quang; Imaizumi, Hideaki; Aoyama Tomonori; Hashiguchi, Tomohiro; Xi, Wang; Morikawa, Hiroyuki; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 79-88; In English; See also 20070002708; Copyright; Avail.: Other Sources

This paper describes recent activities using an NCIT novel optical device, the optical frequency-shift-keying (FSK) modulator, which can provide high-speed control of optical frequency, phase and amplitude. The FSK modulator can generate various types of high-speed optical signals, precisely. We show a couple of examples of recent results on applications of the FSK modulator for next-generation optical communication systems, such as, optical FSK label processing, tunable optical buffer techniques, high-speed differential quadrature-phase-shift-keying (DQPSK) signal generation for 100 GbE and continuous-phase FSK signal generation for dense wavelength-domain-multiplexing.

Author

Quadrature Phase Shift Keying; Optical Data Processing; Frequency Shift Keying; Modulators; High Speed; Multiplexing; Optical Equipment

20070002724 Fujitsu Labs. Ltd., Nakahara, Japan

Compact Photonic Gateway with AOTF for Remotely Controlling λ -Paths

Nakagawa, Goji; Kai, Yutaka; Yoshida, Setsuo; Onaka, Hiroshi; Journal of the National Institute of Information and Communications Technology; June 2006, pp. 89-94; In English; See also 20070002708; Copyright; Avail.: Other Sources

Metro access networks require dynamic provisioning of high-capacity links to achieve bandwidth on-demand because of frequent changes in data services and capacity to the users. We proposed a photonic gateway using Acousto-Optic Tunable Filters for Metro access that provides flexible and rapid any node-to-node connections via the wavelength path with a simple configuration, low cost, and compactness. We developed a prototype and confirmed that using the gateway flexibly establishes connections between any nodes at wavelength path switching speeds of 0.25 ms.

Author

Acousto-Optics; Tunable Filters; Photonics; Void Ratio

20070002736 Lawrence Livermore National Lab., Livermore, CA USA

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics

Runkel, M.; Hwaley-Fedder, R.; Widmayer, C.; Williams, W.; Weinzapfel, C.; Oct. 25, 2005; 16 pp.; In English Report No.(s): DE2006-885386; No Copyright; Avail.: National Technical Information Service (NTIS)

A multi-wavelength laser based system has been constructed to measure defect induced beam modulation (diffraction) from ICF class laser optics. The Nd:YLF-based modulation measurement system (MMS) uses simple beam collimation and imaging to capture diffraction patterns from optical defects onto an 8-bit digital camera at 1053, 527 and 351 nm. The imaging system has a field of view of 4.5 x 2.8 mm (sup 2) and is capable of imaging any plane from 0 to 30 cm downstream from the defect. The system is calibrated using a 477 micron chromium dot on glass for which the downstream diffraction patterns were calculated numerically. Under nominal conditions the system can measure maximum peak modulations of approximately 7:1. An image division algorithm is used to calculate the peak modulation from the diffracted and empty field images after the baseline residual light background is subtracted from both. The peak modulation can then be plotted versus downstream position. The system includes a stage capable of holding optics up to 50 pounds with x and y translation of 40 cm and has been used to measure beam modulation due to solgel coating defects, surface digs on KDP crystals, lenslets in bulk fused silica and laser damage sites mitigated with CO(sub 2) lasers.

NTIS

Defects; Diffraction; Inertial Confinement Fusion; Lasers; Modulation

20070002776 Lawrence Livermore National Lab., Livermore, CA USA

Imaging Performance of the Si/Ge Hybrid Compton Imager

Burks, M.; Chivers, D.; Cork, C.; Cunningham, M.; Fabris, L.; Nov. 14, 2005; 12 pp.; In English

Report No.(s): DE2006-888590; UCRL-CONF-217069; No Copyright; Avail.: National Technical Information Service (NTIS)

The point spread function (PSF) of a fully-instrumented silicon/germanium Compton telescope has been measured as a function of energy and angle. Overall, the resolution ranged from 3 (sup o) to 4 (sup o) FWHM over most of the energy range and field of view. The various contributions to the resolution have been quantified. These contributions include the energy uncertainty and position uncertainty of the detector; source energy; Doppler broadening; and the 1/r broadening characteristic of Compton back-projection. Furthermore, a distortion of the PSF is observed for sources imaged off-axis from the detector. These contributions are discussed and compared to theory and simulations.

NTIS

Doppler Effect; Imaging Techniques; Telescopes

20070002806 NASA Marshall Space Flight Center, Huntsville, AL, USA

The First Light Machine

Stahl, H. Philip; [2006]; 1 pp.; In English; Damon Seminar, 16 Oct. 2006, Boulder, CO, USA; No Copyright; Avail.: Other Sources; Abstract Only

Scheduled to begin is 10 year mission in 2011, the James Webb Space Telescope (JWST) will search for the first luminous objects of the Universe to help answer fundamental questions about how the Universe came to look like it does today. At 6.5 meters in diameter, JWST will be the world's largest space telescope. This talk will review science objectives for JWST and how they are driving the JWST architecture, e.g. aperture, wavelength range and operating temperature. Additionally, the talk will include an overview of the JWST primary mirror technology development effort.

Author

James Webb Space Telescope; Mirrors; Technology Utilization; Universe

20070002807 Spectra Research Systems, Inc., Huntsville, AL, USA

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations

Moore, Jim; Patrick, Brian; [2006]; 1 pp.; In English; NASA Technology Days in the Government, 18-20 Sep. 2006, Albuquerque, NM, USA

Contract(s)/Grant(s): NNM06AA32C; No Copyright; Avail.: Other Sources; Abstract Only

Very large, light weight mirrors are being developed for applications in space. Due to launch mass and volume restrictions these mirrors will need to be much more flexible than traditional optics. The use of primary mirrors with these characteristics will lead to requirements for adaptive optics capable of correcting wave front errors with large amplitude relatively low spatial frequency aberrations. The use of low modulus membrane mirrors actuated with electrostatic attraction forces is a potential solution for this application. Several different electrostatic membrane mirrors are now available commercially. However, as the dynamic range requirement of the adaptive mirror is increased the separation distance between the membrane and the electrodes must increase to accommodate the required face sheet deformations. The actuation force applied to the mirror decreases inversely proportional to the square of the separation distance; thus for large dynamic ranges the voltage requirement can rapidly increase into the high voltage regime. Experimentation with mirrors operating in the KV range has shown that at the higher voltages a serious problem with electrostatic field cross coupling between actuators can occur. Voltage changes on individual actuators affect the voltage of other actuators making the system very difficult to control. A novel solution has been proposed that combines high voltage electrodes with mechanical actuation to overcome this problem. In this design an array of electrodes are mounted to a backing structure via light weight large dynamic range flextensional actuators. With this design the control input becomes the separation distance between the electrode and the mirror. The voltage on each of the actuators is set to a uniform relatively high voltage, thus the problem of cross talk between actuators is avoided and the favorable distributed load characteristic of electrostatic actuation is retained. Initial testing and modeling of this concept demonstrates that this is an attractive concept for increasing the dynamic range capability of electrostatic deformable mirrors.

Author

Deformable Mirrors; Adaptive Optics; Electric Fields; Electric Potential; Deformation; Dynamic Range

20070002811 NASA Marshall Space Flight Center, Huntsville, AL, USA

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly

Stahl, H. Philip; Rowell, Ginger Holmes; Reese, Gayle; Byberg, Alicia; Optical Engineering; August 2005; ISSN 0091-3286; Volume 44, No. 8; 10 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAS8-00187; Copyright; Avail.: Other Sources

A parametric cost model for ground-based telescopes is developed using multivariable statistical analysis of both engineering and performance parameters. While diameter continues to be the dominant cost driver, diffraction-limited wavelength is found to be a secondary driver. Other parameters such as radius of curvature are examined. The model includes an explicit factor for primary mirror segmentation and/or duplication (i.e., multi-telescope phased-array systems). Additionally, single variable models Based on aperture diameter are derived.

Author

Cost Analysis; Telescopes; Apertures; Mirrors; Phased Arrays; Diffraction; Curvature

20070002878 Lawrence Livermore National Lab., Livermore, CA USA

Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier

Jovanovic, I.; Forget, N.; Brown, C. G.; Ebberts, C. A.; Le Blanc, C.; Sep. 23, 2005; 12 pp.; In English

Report No.(s): DE2006-885130; UCRL-PROC-215623; No Copyright; Avail.: Department of Energy Information Bridge

Quasi-phase-matched (QPM) optical parametric chirped-pulse amplification (OPCPA) in periodically poled materials such as periodically poled LiNbO₃ (PPLN) and periodically poled KTiOPO₄ (PPKTP) has been shown to exhibit advantages over the OPCPA in bulk nonlinear crystals. (GHH98, RPN02) The use of the maximum material nonlinear coefficient results in ultra-high gain with low pump peak power. Furthermore, propagation of signal, pump, and idler beams along one of the crystal principal axes eliminates the birefringent walk-off, reduces angular sensitivity, and improves beam quality. Relatively high level of parasitic parametric fluorescence (PF) in QPM OPCPA represents an impediment for simple, single-stage, high-gain amplification of optical pulses from nJ to mJ energies. PF in QPM is increased when compared to PF in critical phase matching in bulk crystals as a result of broader angular acceptance of the nonlinear conversion process. PF reduces prepulse contrast and conversion efficiency by competition with the signal pulse for pump pulse energy. Previous experiments with QPM OPCPA have thus resulted in pulse energies limited to tens of (μ)J. (JSE03) Optical parametric amplification of a narrowband signal pulse in PPKTP utilizing two pump beams has been demonstrated at a mJ-level, (FPK03) but the conversion efficiency has been limited by low energy extraction of pump pulse in the first pass of amplification. Additionally, narrow spectral bandwidth was the result of operation far from signal-idler degeneracy. Here we present a novel double-pass, broad-bandwidth QPM OPCPA. 1.2 mJ of amplified signal energy is produced in a single PPKTP crystal utilizing a single 24-mJ pump pulse from a commercial pump laser. (JFE05) To our knowledge, this is the highest energy demonstrated in QPM OPCPA.

NTIS

Lasers; Light Amplifiers; Parametric Amplifiers

20070002949 NASA Dryden Flight Research Center, Edwards, CA, USA

Fiber Optic Sensor Attachment Development and Performance Evaluations

Piazza, Anthony; Hudson, Larry; Richards, Lance; 2005 Engineering Annual Report; December 2006, pp. 21-22; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE:

<http://hdl.handle.net/2060/20070002949>; Avail.: CASI: A01, Hardcopy

Research conducted in the Flight Loads Laboratory (FLL) at the NASA Dryden Flight Research Center (DFRC) has subjected fiber optic (FO) sensors to hostile environments for in-flight applications and hot-structures ground testing (on hypersonic or reentry vehicles). Sensor attachment of both Fiber Bragg Gratings (FBG) and silica-based Extrinsic Fabry-Perot Interferometers (EFPI) have been accomplished on metallic and composite substrates. The FO sensors have been successfully demonstrated: 1) at room and elevated temperatures (to 1850 F); 2) with combined applied thermal and mechanical loads; and 3) and on both small laboratory coupons and large-scale structures for ground testing. Further development has been initiated to enhance the upper temperature limit for measuring strains. Current ceramic composite materials are to be used for structural load-bearing components and have applications in temperatures as high as 3000 F. A means for taking measurements on these materials at their maximum operating temperature is desired to validate models and ultimately minimize the size and mass of vehicle components.

Author

Fiber Optics; Sensors; Performance Tests; Loads (Forces); Control Surfaces; Fabrication

20070003194 Optical Sciences Corp., Huntsville, AL USA

Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility

Bender, Matt; Beasley, D B; Jan 2000; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAH01-99-C-R076

Report No.(s): AD-A459106; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459106>; Avail.: CASI: A03, Hardcopy

Optical Sciences Corporation has designed and implemented a 116 inch exit pupil relief optical system for dynamic infrared scene projection to flight table mounted seekers at the U.S. Army Missile Command (AMCOM) Research, Development, and Engineering Center (RDEC). The optical system collimates the output from a 512x512 element resistor array in the 3-5mm waveband. The large pupil stand-off is necessary to support projector operation in a millimeter wave (MMW) anechoic chamber. The facility is designed to stimulate a common aperture, dual-band seeker with millimeter wave and IR imagery via a dichroic beam combiner. The dichroic beam combiner is located in the anechoic chamber and reflects the IR scene while transmitting MMW signals. The optical system exhibits distortion of less than 0.5% over the full field of view and chromatic focal shift of less than 10% of the diffraction limited range. The performance of the system is limited by the diffraction limit. This document describes the simulation environment and arrangement, outlines the design procedure from

predesign and achromatization to final tolerancing, and presents final test data and sample imagery.
DTIC

Broadband; Collimators; Infrared Radiation; Optical Equipment; Pupils

20070003317 New Mexico Univ., Albuquerque, NM USA

Modeling Complex Nonlinear Optical Systems

Aceves, Alejandro; Kapitula, Todd; Jul 2006; 29 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0209

Report No.(s): AD-A459336; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459336>; Avail.: CASI: A03, Hardcopy

This research dealt with the modeling of light propagation in nonlinear periodic media including bragg grating fiber arrays and periodic nonlinear 2-dimensional waveguides. The goals set were to find conditions for stable pulse propagation in the arrays and for the search of light bullets, their stability and propagation characteristics in the two dimensional waveguide. We also established conditions for optical trapping in a defect. This is a topic of great interest in the search of all optical logic systems and buffers. A second component of the project dealt with existence and stability of Bose Einstein condensates in periodic magnetic traps. There has been an extensive experimental effort on BEC trapping and our work developed a solid theoretical framework to explore such trapping mechanisms. Tools used in this research include: Dynamical systems, numerical methods for nonlinear partial differential equations, asymptotic analysis. The project had also an important educational component as it served to train 3 graduate students in Applied Mathematics and provided a seed for a new crop of students working in this field.

DTIC

Complex Systems; Nonlinear Optics; Nonlinear Systems

75

PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

20070002571 Lawrence Livermore National Lab., Livermore, CA USA

Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion

Froula, D. H.; Davis, P.; Ross, S.; Meezan, N.; Divol, L.; Sep. 30, 2005; 12 pp.; In English

Report No.(s): DE2006-885141; UCRL-PROC-215792; No Copyright; Avail.: National Technical Information Service (NTIS)

The dispersion of ion-acoustic fluctuations has been measured using a novel technique that employs multiple color Thomson-scattering diagnostics to measure the frequency spectrum for two separate thermal ion-acoustic fluctuations with significantly different wave vectors. The plasma fluctuations are shown to become dispersive with increasing electron temperature. We demonstrate that this technique allows a time resolved local measurement of electron density and temperature in inertial confinement fusion plasmas.

NTIS

Electron Density (Concentration); Electron Energy; High Temperature Plasmas; Laser Plasmas

20070002585 Lawrence Livermore National Lab., Livermore, CA USA

Analyses in Support of Z-IFE LLNL Progress Report for FY-05

Moir, R. W.; Abbott, R. P.; Callahan, D. A.; Latkowski, J. F.; Meier, W. R.; Oct. 19, 2005; 62 pp.; In English

Report No.(s): DE2006-885397; UCRL-TR-216327; No Copyright; Avail.: National Technical Information Service (NTIS)

The FY04 LLNL study of Z-IFE (1) proposed and evaluated a design that deviated from SNLs previous baseline design. The FY04 study included analyses of shock mitigation, stress in the first wall, neutronics and systems studies. In FY05, the subject of this report, we build on our work and the theme of last year. Our emphasis continues to be on alternatives that hold promise of considerable improvements in design and economics compared to the base-line design. Our key results are summarized here.

NTIS

Plasma Physics; Technology Utilization; Nuclear Fusion

20070002593 Stanford Univ., CA, USA, Istituto Nazionale di Fisica Nucleare, Rome, Italy

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape

Ceresol, A.; Dall'Agata, G.; Giriyavets, A.; Kallosh, R.; Linde, A.; January 2006; 56 pp.; In English

Report No.(s): DE2006-885283; SLAC-PUB-11883; No Copyright; Avail.: National Technical Information Service (NTIS)

We develop a theory of static BPS domain walls in stringy landscape and present a large family of BPS walls interpolating between different supersymmetric vacua. Examples include KKLT models, STU models, type IIB multiple flux vacua, and models with several Minkowski and AdS vacua. After the uplifting, some of the vacua become dS, whereas some others remain AdS. The near-BPS walls separating these vacua may be seen as bubble walls in the theory of vacuum decay. As an outcome of our investigation of the BPS walls, we found that the decay rate of dS vacua to a collapsing space with a negative vacuum energy can be quite large. The parts of space that experience a decay to a collapsing space, or to a Minkowski vacuum, never return back to dS space. The channels of irreversible vacuum decay serve as sinks for the probability flow. The existence of such sinks is a distinguishing feature of the landscape. We show that it strongly affects the probability distributions in string cosmology.

NTIS

Bubbles; Cosmology; Domain Wall; Supersymmetry; Terrain; Topography; Vacuum

20070002739 Lawrence Livermore National Lab., Livermore, CA USA

Fundamentals of ICF Hohlräume

Rosen, M. D.; Oct. 04, 2005; 50 pp.; In English

Report No.(s): DE2006-885380; UCRL-PROC-215898; No Copyright; Avail.: National Technical Information Service (NTIS)

On the Nova Laser at LLNL, we demonstrated many of the key elements required for assuring that the next laser, the National Ignition Facility (NIF) will drive an Inertial Confinement Fusion (ICF) target to ignition. The indirect drive (sometimes referred to as radiation drive) approach converts laser light to x-rays inside a gold cylinder, which then acts as an x-ray oven (called a hohlraum) to drive the fusion capsule in its center. On Nova we've demonstrated good understanding of the temperatures reached in hohlraums and of the ways to control the uniformity with which the x-rays drive the spherical fusion capsules. In these lectures we will be reviewing the physics of these laser heated hohlraums, recent attempts at optimizing their performance, and then return to the ICF problem in particular to discuss scaling of ICF gain with scale size, and to compare indirect vs. direct drive gains. In ICF, spherical capsules containing Deuterium and Tritium (DT)--the heavy isotopes of hydrogen--are imploded, creating conditions of high temperature and density similar to those in the cores of stars required for initiating the fusion reaction. When DT fuses an alpha particle (the nucleus of a helium atom) and a neutron are created releasing large amount amounts of energy. If the surrounding fuel is sufficiently dense, the alpha particles are stopped and can heat it, allowing a self-sustaining fusion burn to propagate radially outward and a high gain fusion micro-explosion ensues. To create those conditions the outer surface of the capsule is heated (either directly by a laser or indirectly by laser produced x-rays) to cause rapid ablation and outward expansion of the capsule material.

NTIS

Hohlraums; Inertial Confinement Fusion; Lasers

20070002744 Lawrence Livermore National Lab., Livermore, CA USA

Overview of Recent Progress in US Fast Ignition Research

Freeman, R. R.; Akli, K.; Beg, F.; Betti, R.; Chen, S.; Sep. 30, 2005; 16 pp.; In English

Report No.(s): DE2006-885373; UCRL-PROC-215798; No Copyright; Avail.: Department of Energy Information Bridge

The Fast Ignition Program in the USA has enjoyed increased funding in various forms from the Office of Fusion Energy Sciences of the Department of Energy. The program encompasses experiments on large laser facilities at various world-wide locations, and benefits enormously from collaborations with many international scientists. The program includes exploratory work in cone-target design and implosion dynamics, high electron current transport measurements in normal density materials, development of diagnostics for heating measurements, generation of protons from shaped targets, theoretical work on high gain target designs, and extensive modeling development using PIC and hybrid codes.

NTIS

Ignition; Progress

20070002761 Lawrence Livermore National Lab., Livermore, CA USA

Radiation-Driven Hydrodynamics of Long Pulse Hohlräume on the National Ignition Facility

Dewald, D. L.; Landen, O. L.; Suter, L. J.; Schein, J.; Holder, J.; Nov. 09, 2005; 36 pp.; In English

Report No.(s): DE2006-885408; UCRL-CONF-216946; No Copyright; Avail.: National Technical Information Service (NTIS)

The first hohlraum experiments on the National Ignition Facility (NIF) using the first four laser beams have activated the indirect drive experimental capabilities and tested radiation temperature limits imposed by hohlraum plasma filling. Vacuum hohlraums have been irradiated with laser powers up to 6 TW, 1 ns to 9 ns long square pulses and energies of up to 17 kJ to activate several diagnostics, to study the hohlraum radiation temperature scaling with the laser power and hohlraum size, and to make contact with hohlraum experiments performed at the NOVA and Omega laser facilities. Furthermore, for a variety of hohlraum sizes and pulse lengths, the measured x-ray flux shows signatures of plasma filling that coincide with hard x-ray emission from plasma streaming out of the hohlraum. These observations agree with hydrodynamic simulations and with analytical modeling that includes hydrodynamic and coronal radiative losses. The modeling predicts radiation temperature limits on full NIF (1.8 MJ) that are significantly greater than required for ignition hohlraums.

NTIS

Hohlraums; Hydrodynamics; Ignition

20070002875 Lawrence Livermore National Lab., Livermore, CA USA

Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06

Molvik, A. W.; Sep. 23, 2005; 10 pp.; In English

Report No.(s): DE2006-885134; UCRL-TR-215634; No Copyright; Avail.: Department of Energy Information Bridge

The Heavy-Ion Fusion (HIF) group, under the DOE Office of Fusion Energy Science (OFES) funding, has been carrying out studies of e-cloud and gas primarily for our own needs. During this effort we have developed unique experimental and simulation tools that we believe have broader applications. To a limited degree, as part of OFES' charter, we can pursue basic science for plasma and accelerator research and can also pursue issues of interest in high energy physics and other areas of accelerator research. We would appreciate your suggestions on specific needs that you have for which we might be able to make contributions towards understanding and mitigation. The following list of potential tasks provides a guide to our capabilities, plus some directions that we are considering; they are designed around our facilities, but we are open to collaborating at other sites. We will be firming up our plans after funding is set for the year we currently expect that to happen in late October. The following list of tasks for FY06 assumes significant restoration of funds by Congress to a similar level as in FY05. Each area would be studied with coordinated experimental and simulation efforts. Most of these tasks deal with electron or gas issues, the last few are more general high-brightness beam issues.

NTIS

Desorption; Electron Clouds; Fusion; Heavy Ions

20070002877 Lawrence Livermore National Lab., Livermore, CA USA

New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression

Molvik, A. W.; Covo, M. K.; Cohen, R. H.; Friedman, A.; Bieniosek, F. M.; Mar. 17, 2006; 8 pp.; In English

Report No.(s): DE2006-885133; UCRL-CONF-219887; No Copyright; Avail.: Department of Energy Information Bridge

We study electron clouds in high perveance beams ($K = 8E-4$) with a large tune depression of 0.2 (defined as the ratio of a single particle oscillation response to the applied focusing fields, with and without space charge). These 1 MeV, 180 mA, K^+ beams have a beam potential of +2 kV when electron clouds are minimized. Simulation results are discussed in a companion paper (J-L. Vay, this Conference). We have developed the first diagnostics that quantitatively measure the accumulation of electrons in a beam. This, together with measurements of electron sources, will enable the electron particle balance to be measured, and electron-trapping efficiencies determined. We, along with colleagues from GSI and CERN, have also measured the scaling of gas desorption with beam energy and dE/dx . Experiments where the heavy-ion beam is transported with solenoid magnetic fields, rather than with quadrupole magnetic or electrostatic fields, are being initiated. We will discuss initial results from experiments using electrode sets (in the middle and at the ends of magnets) to either expel or to trap electrons within the magnets. We observe electron oscillations in the last quadrupole magnet when we flood the beam with electrons from an end wall. These oscillations, of order 10 MHz, are observed to grow from the center of the magnet while drifting upstream against the beam, in good agreement with simulations.

NTIS

Electron Clouds; Electrostatics; Ion Beams

20070003115 Brown Univ., Providence, RI USA

A Discontinuous Galerkin Method for Two-Temperature Plasmas

Lin, Guang; Karniadakis, George E; Mar 11, 2005; 37 pp.; In English

Report No.(s): AD-A458981; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458981>; Avail.: CASI: A03, Hardcopy

We develop a formulation for the single-fluid/two-temperature equations for simulating two-species, compressible, non-equilibrium plasma flows. The divergence-free condition of the magnetic field is enforced via the characteristic decomposition of an extended nine-wave system. The source terms are modified appropriately to improve energy and momentum conservation accuracy. A spectral/hp element algorithm is employed in the discretization combined with a discontinuous Galerkin formulation for the advective and diffusive contributions. The formulation is conservative, and monotonicity is enforced by appropriately lowering the spectral order around discontinuities. A new MHD flux introduced here is the MHD-HLLC (Harten-Lax-van Leer Contact wave) flux that preserves monotonicity and resolves contact discontinuity better. Exponential convergence is demonstrated for a magneto-hydrostatic problem. Two tests are presented using the new MHD-HLLC flux. Also, the differences between the single-temperature and the two-temperature models are presented for two-dimensional plasma flows around bluff bodies are simulated.

DTIC

Galerkin Method; Magnetohydrodynamics; Plasmas (Physics)

20070003257 Army Research Lab., Aberdeen Proving Ground, MD USA

Ablation Loss Studies for Capillary - Sustained Plasmas

Williams, Anthony W; Beyer, Richard A; Nov 2006; 18 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-43

Report No.(s): AD-A459247; ARL-MR-651; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459247>; Avail.: CASI: A03, Hardcopy

The most common discharge geometry used for efficiently generating plasma from stored electrical energy for gun ignition utilizes a capillary tube to contain, direct, and sustain the discharge. The plasma gas composition is determined by the air in the tube before discharge begins and by materials removed from the capillary tube wall, electrodes, and exploding wire used to start the event. The conductivity of the plasma in the capillary affects the discharge and the conversion of energy. The optimized materials, properties, and geometries for these components have not been identified. A reasonable first step in understanding the capillary tube dynamics would be to model and experimentally quantify parameters of interest. In the present work, a series of parametric experiments has been conducted utilizing polyethylene and Teflon capillary-sustained plasmas in which the mass ablation for the capillary tube is measured. The capillary geometry, exploding wire geometry, and material and energy input to the plasma have been varied to provide insight into their respective effects on the ablation. A systematic study of the efficiency of stored energy deposited into the plasma will be made with capillary wall material, capillary diameter and length, and the effects of exploding wires as variables. Observations and their implication on validation of capillary tube models are discussed.

DTIC

Ablation; Ignition; Losses; Plasma Generators; Plasmas (Physics)

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*.

20070002144 NASA Marshall Space Flight Center, Huntsville, AL, USA

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace

Fuss, T.; Ray, C. S.; Day, D. E.; [2006]; 1 pp.; In English; 8th International Symposium on Crystallization of Glasses and Liquids, 24-28 Sep. 2006, Jackson Hole, WY, USA; Copyright; Avail.: Other Sources; Abstract Only

Crystallization kinetics for lithium disilicate, $\text{Li}_2\text{O}_2\text{SiO}_2$, (LS2) glass has been studied extensively by nonisothermal methods, but only a few studies on the isothermal crystallization kinetics of LS2 are available. In the present research, isothermal crystallization experiments on the LS2 glass were conducted in a Trans Temp furnace between 600 and 635 C, and selected properties such as the activation energy for crystallization (E), crystal growth index or Avrami parameter (n), the concentration of quenched-in nuclei in the starting glass (Ni) and the crystal nucleation rate (I) were measured. The crystal

nucleation rate (I) was measured at only one selected temperature of 452 C, at this time. This commercial furnace has a 13 cm long isothermal heating zone (+/- 1 C) that allows precise heat treatment of relatively large samples. By placing a thermocouple within approx. 2 mm of the sample, it was possible to detect the heat of crystallization in the form of an isothermal crystallization exotherm during isothermal heat treatment of the sample. The values of E (318 plus or minus 10 kJ/mol), n (3.6 plus or minus 0.1), and N_i ($1.6 \times 10^{12} \text{ m}^{-3}$) calculated by analyzing these isotherms using the standard Johnson-Mehl-Avrami (JMA) equation were reproducible and in agreement with the literature values. The value of I, $1.9 \times 10^{10} \text{ m}^{-3} \text{ s}^{-1}$ at 452 C, is an order of magnitude higher than the reported value for LS2.

Author

Crystallization; Furnaces; Glass; Isotherms; Kinetics; Lithium

20070002564 Brookhaven National Lab., Upton, NY USA

Instabilities in Nb₃Sn Wires

Jun. 2006; 16 pp.; In English

Report No.(s): DE2006-888471; No Copyright; Avail.: National Technical Information Service (NTIS)

High current-density Nb₃Sn strands made by internal-tin routes are not stable against flux jumps at low fields. Since flux jumps release heat, they can initiate quenching if thermal conductivity to the liquid helium is poor. To make matters worse, tin is a potent contaminant of copper, and reaction of strands to maximize performance leads to the loss of thermal conductivity. We discuss how the root of a solution of this problem lies in optimizing two parameters, RRR and J_c , instead of J_c alone. An important workaround for magnet designers is controlling the balance between performance and stability by reducing the temperature or time of the final heat treatment step. This provides ample J_c while also keeping RRR high. Under these conditions, the instability current density threshold J_s is higher than J_c . Additional factors are also available to improve the management of instabilities, including new strand designs with smaller sub-elements or divided sub-elements.

NTIS

Particle Accelerators; Stability; Thermal Conductivity; Wire

20070002567 Lawrence Livermore National Lab., Livermore, CA USA

Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D

Casper, T. A.; Burrenll, K. H.; Doyle, E. J.; Gohil, P.; Lasnier, C. J.; Oct. 12, 2005; 28 pp.; In English

Report No.(s): DE2006-885145; UCRL-CONF-216120; No Copyright; Avail.: National Technical Information Service (NTIS)

Quiescent double barrier (QDB) conditions often form when an internal transport barrier is created with high-power neutral-beam injection into a quiescent H-mode (QH) plasma. These QH-modes offer an attractive, high-performance operating scenario for burning plasma experiments due to their quasi-stationarity and lack of edge localized modes (ELMs). Our initial experiments and modeling using ECH/ECCD in QDB shots were designed to control the current profile and, indeed, we have observed a strong dependence on the q-profile when EC-power is used inside the core transport barrier region. While strong electron heating is observed with EC power injection, we also observe a drop in the other core parameters; ion temperature and rotation, electron density and impurity concentration. These dynamically changing conditions provide a rapid evolution of T_e and T_i profiles accessible with $0.3 \leq (T_e/T_i)_{\text{axis}} \leq 0.8$ observed in QDB discharges. We are exploring the correlation and effects of observed density profile changes with respect to these time-dependent variations in the temperature ratio. Thermal and particle diffusivity calculations over this temperature ratio range indicate a consistency between the rise in temperature ratio and an increase in transport corresponding to the observed change in density.

NTIS

Cyclotron Radiation; Electron Density (Concentration); Injection; Particle Accelerators; Temperature Profiles

20070002590 Stanford Linear Accelerator Center, CA, USA, Paul Scherrer Inst., Wuerenlingen, Switzerland, Illinois Univ. at Urbana-Champaign, IL, USA

High Performance Computing in Accelerating Structure Design and Analysis

Li, Z.; Folwell, N.; Ge, L.; Guetz, A.; Ivanov, V.; January 2006; 10 pp.; In English

Report No.(s): DE2006-885288; SLAC-PUB-11914; No Copyright; Avail.: National Technical Information Service (NTIS)

Future high-energy accelerators such as the Next Linear Collider (NLC) will accelerate multi-bunch beams of high current and low emittance to obtain high luminosity, which put stringent requirements on the accelerating structures for efficiency and

beam stability. While numerical modeling has been quite standard in accelerator R&D, designing the NLC accelerating structure required a new simulation capability because of the geometric complexity and level of accuracy involved. Under the US DOE Advanced Computing initiatives (first the Grand Challenge and now SciDAC), SLAC has developed a suite of electromagnetic codes based on unstructured grids and utilizing high performance computing to provide an advanced tool for modeling structures at accuracies and scales previously not possible. This paper will discuss the code development and computational science research (e.g. domain decomposition, scalable eigensolvers, adaptive mesh refinement) that have enabled the large-scale simulations needed for meeting the computational challenges posed by the NLC as well as projects such as the PEP-II and RIA. Numerical results will be presented to show how high performance computing has made a qualitative improvement in accelerator structure modeling for these accelerators, either at the component level (single cell optimization), or on the scale of an entire structure (beam heating and long range wakefields).

NTIS

Design Analysis; Particle Accelerators

20070002595 Lawrence Livermore National Lab., Livermore, CA USA

Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics

Hau-Riege, S.; January 2006; 10 pp.; In English

Report No.(s): DE2006-885148; UCRL-TR-215833; No Copyright; Avail.: National Technical Information Service (NTIS)

We list the materials that are anticipated to be placed into the Linac Coherent Light Source (LCLS) x-ray free electron laser (XFEL) beam line, their positions, and the absorbed dose, and compare this dose with anticipated damage thresholds.

NTIS

Adsorption; Coherent Light; Free Electron Lasers; Light Sources; Linear Accelerators; X Ray Lasers; X Ray Optics; Radiation Dosage

20070002735 Lawrence Livermore National Lab., Livermore, CA USA

Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons

Dauffy, L. S.; Koch, J. A.; Nov. 08, 2005; 32 pp.; In English

Report No.(s): DE2006-885389; UCRL-TR-216920; No Copyright; Avail.: National Technical Information Service (NTIS)

This report investigates the use of x-rays and electrons to excite a CVD polycrystalline diamond detector during a double pulse experiment to levels corresponding to those expected during a successful (1D clean burn) and a typical failed ignition (2D fizzle) shot at the National Ignition Facility, NIF. The monitoring of a failed ignition shot is the main goal of the diagnostic, but nevertheless, the study of a successful ignition shot is also important. A first large neutron pulse is followed by a smaller pulse (a factor of 1000 smaller in intensity) after 50 to 300 ns. The charge carrier densities produced during a successful and failed ignition shot are about 10^{15} e-h/cm³ and 2.6×10^{12} e-h/cm³ respectively, which is lower than the 10^{16} e-h/cm³ needed to saturate the diamond wafer due to charge recombination. The charge carrier density and the signal induced in the diamond detector are calculated as a function of the incident x-ray and electron energy, flux, and detector dimensions. For available thicknesses of polycrystalline CVD diamond detectors (250 (micro)m to 1000 (micro)m), a flux of over 10^{11} x-rays/cm² (with x-ray energies varying from 6 keV to about 10 keV) or 10^9 (beta)/cm² (corresponding to 400 pC per electron pulse, $E(\text{beta}) \approx 800$ keV) is necessary to excite the detector to sufficient levels to simulate a successful ignition's 14 MeV peak.

NTIS

Charge Carriers; Diamonds; Electrons; Linear Accelerators; Neutrons; Particle Accelerators; Vapor Deposition; X Rays

20070002740 Lawrence Livermore National Lab., Livermore, CA USA

Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling

Vay, J. L.; Furman, M. A.; Seidl, P. A.; Cohen, R. H.; Friedman, A.; Oct. 12, 2005; 12 pp.; In English

Report No.(s): DE2006-885379; UCRL-PROC-216104; No Copyright; Avail.: National Technical Information Service (NTIS)

Electron clouds and gas pressure rise limit the performance of many major accelerators. A multi-laboratory effort to understand the underlying physics via the combined application of experiment, theory, and simulation is underway. We present here the status of the simulation capability development, based on a merge of the three-dimensional parallel Particle-In-Cell (PIC) accelerator code WARP and the electron cloud code POSINST, with additional functionalities. The development of the new capability follows a roadmap describing the different functional modules, and their inter-relationships, that are ultimately needed to reach self-consistency. Newly developed functionalities include a novel particle mover bridging the time scales

between electron and ion motion, a module to generate neutrals desorbed by beam ion impacts at the wall, and a module to track impact ionization of the gas by beam ions or electrons. Example applications of the new capability to the modeling of electron effects in the High Current Experiment (HCX) are given.

NTIS

Electron Clouds; Particle Accelerators; Self Consistent Fields

20070002743 Lawrence Livermore National Lab., Livermore, CA USA

Numerical Study of X-Ray Diffraction Effects within Objects

Lehman, S. K.; Nov. 14, 2005; 62 pp.; In English

Report No.(s): DE2006-885376; UCRL-TR-217063; No Copyright; Avail.: National Technical Information Service (NTIS)

X-rays, being waves, always undergo the propagation effects of reflection, refraction, diffraction, geometric attenuation and absorption. In most circumstances the first four effects are considered negligible given the resolution sizes demanded of the measurement systems, x-ray energies involved, and physical properties of the materials under evaluation. We have reached the point, however, in some x-ray non-destructive evaluation (NDE) and imaging where we wish to resolve features of micrometer size in millimeter size objects to less than micrometer resolution. Given this resolution and the sizes of the measurement systems, diffraction effects within the object may become observable. We studied the extent to which diffraction is observable numerically using a two-dimensional paraxial approximation wave propagation code using a multislice method. We modeled realistic parts of interest at worst-case x-ray energies, comparing wave propagation and straight-ray simulated results. In two cases, we compare the numerical results to experimental measurements. The conclusion, based upon the results of the simulation code, is that diffraction effects on the measured data will be insignificant. However, we demonstrate by a single example, that in certain cases diffraction effects may be significant.

NTIS

Numerical Analysis; Wave Propagation; X Ray Diffraction

20070002745 Lawrence Livermore National Lab., Livermore, CA USA

Materials Response under Extreme Conditions

Remington, B. A.; Lorenz, K. T.; Pollaine, S.; McNaney, J. M.; Oct. 19, 2006; 14 pp.; In English

Report No.(s): DE2006-885374; UCRL-PROC-216343; No Copyright; Avail.: National Technical Information Service (NTIS)

Solid state experiments at extreme pressures, 10-100 GPa (0.1-1 Mbar) and strain rates (10^{6} - 10^{8} s⁻¹) are being developed on high-energy laser facilities. The goal is an experimental capability to test constitutive models for high-pressure, solid-state strength for a variety of materials. Relevant constitutive models are discussed, and our progress in developing a quasi-isentropic, ramped-pressure, shockless drive is given. Designs to test the constitutive models with experiments measuring perturbation growth due to the Rayleigh-Taylor instability in solid-state samples are presented.

NTIS

Lasers; Mechanical Properties; Solid State; Strain Rate

20070002762 Lawrence Livermore National Lab., Livermore, CA USA

Performance of a Nanometer Resolution BPM System

Vogel, V.; Hayano, H.; Honda, Y.; Terunuma, N.; Urakawa, J.; Oct. 18, 2005; 28 pp.; In English

Report No.(s): DE2006-885404; UCRL-CONF-216283; No Copyright; Avail.: National Technical Information Service (NTIS)

International Linear Collider (ILC) interaction region beam sizes and component position stability requirements will be as small as a few nanometers. It is important to the ongoing ILC design effort to demonstrate that these tolerances can be achieved--ideally using beam-based stability measurements. It has been estimated that an RF cavity BPM with modern waveform processing could provide a position measurement resolution of less than one nanometer. Such a system could form the basis of the desired beam-based stability measurement, as well as be used for other specialized purposes. They have developed a high resolution RF cavity BPM and associated electronics. A triplet comprised of these BPMs has been installed in the extraction line of the KEK Accelerator Test Facility (ATF) for testing with its ultra-low emittance beam.

NTIS

Particle Accelerators; Stability

20070002795 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Development of BPM Electronics at the JLAB FEL

Sexton, D.; Evtushenko, P.; Jordan, K.; Yan, J.; Dutton, S.; January 2006; 10 pp.; In English

Report No.(s): DE2006-885422; No Copyright; Avail.: National Technical Information Service (NTIS)

A new version of BPM electronics based on the AD8362 RMS detector, which is a direct RF to DC converter, is under development at the JLAB FEL. Each of these new BPM electronics utilizes an embedded ColdFire Microprocessor for data processing and communication with the EPICS control system via TCP/IP. The ColdFire runs RTEMS, which is an open source real-time operating system. The JLAB FEL is a SRF Energy Recovery LINAC capable of running up to 10 mA CW beam with the micropulse up to 74.85 MHz. For diagnostic reasons and for the machine tune up, the micropulse frequency can be reduced to 1.17 MHz, which corresponds to about 160 questionA of beam current. It is required that the BPM system would be functional for all micropulse frequencies. By taking into account the headroom for the beam steering and current variations the dynamic range of the RF front end is required to be about 60 dB. A BPM resolution of at least 100 questionm is required, whereas better resolution is very desirable to make it possible for more accurate measurements of the electron beam optics. Some results of the RF front end development are presented as well as the first measurements made with an electron beam.

NTIS

Beam Currents; Electron Beams; Free Electron Lasers; Particle Accelerators

20070002865 Lawrence Livermore National Lab., Livermore, CA USA

Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging

Marchesini, S.; Chapman, H. N.; Barty, A.; Howells, M. R.; Cui, C.; Oct. 04, 2005; 12 pp.; In English

Report No.(s): DE2006-885360; UCRL-PROC-215874; No Copyright; Avail.: National Technical Information Service (NTIS)

The Fourier inversion of phased coherent diffraction patterns offers images without the resolution and depth-of-focus limitations of lens-based tomographic systems. We report on our recent experimental images inverted using recent developments in phase retrieval algorithms, and summarize efforts that led to these accomplishments. These include abinitio reconstruction of a two-dimensional test pattern, infinite depth of focus image of a thick object, and its high-resolution ((approx)10 nm resolution) three-dimensional image. Developments on the structural imaging of low density aerogel samples are discussed.

NTIS

Imaging Techniques; Progress; X Ray Diffraction

20070003267 EM Photonics, Inc., Newark, DE USA

Photonic Band Gap Devices for Commercial Applications

Sharkawy, Ahmed; Shi, Shouyuan; Chen, Caihua; Prather, Dennis; Oct 12, 2006; 43 pp.; In English

Contract(s)/Grant(s): FA9550-04-C-0062

Report No.(s): AD-A459258; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459258>; Avail.: CASI: A03, Hardcopy

The overall objective of this STTR program is to define and develop a unified manufacturing process for Photonic Band Gap (PBG) devices that combines design, simulation, fabrication, and test. By investigating devices that serve the needs of current Air Force research programs, EM Photonics and the University of Delaware can achieve their technology transfer objectives and at the same time provide the most meaningful results to the Air Force. To achieve these goals we took a three tiered approach: (1) establish close working relationships with two AFRL research teams (one located at Hanscom, AFB, POC Dr. Richard Soref and the other at Wright Patterson, AFB, POCs Drs. Anthony Crespo and Thomas Nelson); (2) identify and demonstrate the feasibility of suitable nano-phonic devices for rapid commercialization; and (3) explore further reaching and novel devices and fabrication processes for next generation photonic band gap technologies. Within the context of our Phase I effort we have succeeded in each of these areas and, as a result, are very anxious to begin a Phase II effort to continue our strong collaboration with the ARL researchers and the commercialization of nano-phonic devices.

DTIC

Crystals; Energy Gaps (Solid State)

PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also 72 *Atomic and Molecular Physics*, 73 *Nuclear Physics*, and 25 *Inorganic, Organic and Physical Chemistry*.

20070003295 Massachusetts Inst. of Tech., Cambridge, MA USA

Integration with Respect to Operator-Valued Measures with Applications to Quantum Estimation Theory

Mitter, Sanjoy K; Young, Stephen K; Mar 1983; 80 pp.; In English

Contract(s)/Grant(s): AFOSR-77-3281D; AFOSR-82-0135

Report No.(s): AD-A459294; LIDS-P-1278; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459294>; Avail.:

CASI: A05, Hardcopy

The problem of quantum measurement has received a great deal of attention in recent years, both in the quantum physics literature and in the context of optical communications. An account of these ideas may be found in Davies [1976] and Holevo [1973]. The development of a theory of quantum estimation requires a theory of integration with respect to operator-valued measures. Indeed, Holevo [1973] in his investigations on the Statistical Decision Theory for Quantum Systems develops such a theory which, however, is more akin to Riemann Integration. The objective of this paper is to develop a theory which is analogous to Lebesgue integration and which is natural in the context of quantum physics problems and show how this can be applied to quantum estimation problems. The theory that we present has little overlap with the theory of integration with respect to vector measures nor the integration theory developed by Thomas [1970].

DTIC

Estimating; Quantum Theory

20070003297 Yale Univ., New Haven, CT USA

Student Support: Spin Decoherence Measurements for Solid State Qubits

Barrett, Sean E; Oct 2005; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0203

Report No.(s): AD-A459296; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459296>; Avail.: CASI: A03,

Hardcopy

This project supported Mr. Dale Li with a Quantum Computation Graduate Research (QuaCGR) Fellowship. Dale played a key role as the most senior student in our group, during our work on the research grant #DAAD19-01-1-0507 Spin Decoherence Measurements for Solid State Qubits . That project's initial goal was to measure decoherence times for solid-state qubits. We unexpectedly found a clear discrepancy between two different standard measurements of T_2 . Specifically, well-known multiple Pi-pulse spin echo experiments had the ability either to freeze out or to accelerate the signal decay expected due to the spin-spin dipolar coupling, reminiscent of the quantum Zeno effect. Dale implemented a series of careful experiments that identified the essential spin Hamiltonian. In addition, he worked on the theoretical description using both analytical techniques and numerical simulation. Dale s work revealed a novel many-body effect, arising from the tiny spin-spin interactions acting during strong, but finite, control pulses. Similar effects should be expected for most physical qubits (not just spins) driven by 'bang-bang' control sequences, or other pulse control sequences.

DTIC

Nuclear Magnetic Resonance; Numerical Analysis; Quantum Theory; Semiconductors (Materials); Solid State; Students

20070003356 Iowa Univ., Iowa City, IA USA

Spin Coherence in Semiconductor Nanostructures

Flatte, Michael E; Dec 10, 2006; 22 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0490

Report No.(s): AD-A459443; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459443>; Avail.: CASI: A03,

Hardcopy

We report progress in calculations of spin coherence and spin transport properties in nanoscale geometries, including calculations of g-factors in quantum dots, exchange interactions in Si/Ge quantum dots, tuning of spin coherence times for electron spin, tuning of dipolar magnetic fields for nuclear spin, spontaneous spin polarization generation and new designs for spin-based teleportation and spin transistors. Our new proposal for electron-spin based teleportation is mediated by single photons and does not require correlated photon detection (Bell detection). We find that electric transport in nonmagnetic semiconductors is unstable to the formation of spin polarized packets at room temperature. We also predict that orbital angular

momentum quenching in quantum dots will drive g factors closer to 2 than previously expected. These calculations may be of use in semiconductor spintronic devices or quantum computation.

DTIC

Nanostructures (Devices); Particle Spin; Quantum Dots; Quantum Numbers; Quantum Theory; Semiconductors (Materials)

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*.

20070002116 Massachusetts Univ., Amherst, MA USA

Monitoring the News: A TDT Demonstration System

Frey, David; Gupta, Rahul; Khandelwal, Vikas; Lavrenko, Victor; Leuski, Anton; Allan, James; Jan 2001; 6 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-99-1-8912

Report No.(s): AD-A458553; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458553>; Avail.: Defense Technical Information Center (DTIC)

We describe a demonstration system built upon Topic Detection and Tracking (TDT) technology. The demonstration system monitors a stream of news stories, organizes them into clusters that represent topics, presents the clusters to a user, and visually describes the changes that occur in those clusters over time. A user may also mark certain clusters as interesting, so that they can be 'tracked' more easily.

DTIC

Information Retrieval; Detection; Tracking (Position)

20070002117 Military Academy, West Point, NY USA

Militant Ideology Atlas: Research Compendium

McCants, William; Brachman, Jarret; Felter, Joseph; Nov 2006; 362 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458481; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458481>; Avail.: Defense Technical Information Center (DTIC)

The Combating Terrorism Center (CTC) at West Point has dedicated many of its resources this year to understanding the Jihadi ideology through the words of its adherents. In its 'Harmony and Disharmony' report, the CTC exposed the organizational weaknesses of al-Qaida using its own internal documents. CTC's 'Jihadi Imagery Report' cataloged frequently used images in Jihadi propaganda. The translation of Abu Bakr Naji's 'Management of Savagery' focused new attention on the Jihadi Movement's grand strategy in the Middle East. And 'Stealing al-Qa ida's Playbook' exposed the ideology's soft underbelly by using the writings of Jihadi scholars and ideologues. The 'Militant Ideology Atlas' is the CTC's most recent and comprehensive attempt to better understand the ideology driving the Jihadi Movement. The empirically supported findings from this effort are generated by a systematic research methodology and critical analyses of hundreds of al-Qaida's most widely read and influential texts. The wealth of information contained in the Atlas's Research Compendium provides a new generation of scholars and analysts with the data and evidence they need to understand these adversaries and to devise strategies for combating them. The Atlas is a major step toward that goal, and it empowers scholars with a critical resource needed to contribute to such efforts. The first part of this compendium lists Jihad's most popular texts from Tawhed.ws, including name of work transliterated, name of work translated into English, author, number of times read, number of times downloaded, and brief notation on content. Part 2 is a bibliography that includes cataloging information for, and summaries of, 93 of the most popular Jihadi texts, with notes. Part 3 contains biographies of 132 Jihadi authors and frequently cited figures. The biographies include name transliterated, name in Arabic, aliases, birth and death dates, country of origin, background, a photograph (if available), and notes.

DTIC

Biography; Military Technology; Terrorism

20070002138 Military Academy, West Point, NY USA

Militant Ideology Atlas: Executive Report

McCants, William; Brachman, Jarret; Felter, Joseph; Nov 2006; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458483; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458483>; Avail.: CASI: A03, Hardcopy

The Combating Terrorism Center (CTC) at West Point has dedicated many of its resources this year to understanding the Jihadi ideology through the words of its adherents. The 'Militant Ideology Atlas' is the CTC's most recent and comprehensive attempt to better understand the ideology driving the Jihadi Movement. This Executive Report and its accompanying Research Compendium provide the first systematic mapping of the ideology driving the actions of the terrorists responsible for the 9/11 attacks and other violent actions around the world. Using a robust research methodology and critical analyses of the Jihadis' most widely read texts, the Atlas gives us a highly nuanced map of the major thinkers in the Jihadi Movement and their most salient areas of consensus and disagreement. This Executive Report identifies who the most influential people are among the Jihadi thinking class, what they are thinking, and where the movement is most vulnerable ideologically. The report uses these empirical findings to identify powerful messages and influential messengers that can turn different constituencies against the Jihadis. These constituencies range from benign mainstream Muslims to the most violent Jihadis. The recommendations of this report establish a baseline against which strategic communications campaigns can be calibrated and adjusted. Appendix I is an Ideological Influence Map. Arrows indicate who is citing whom; thick lines are for an author who cites another author repeatedly; and the larger nodes indicate someone who is a key broker of information in the network. Appendix II is a listing of author names that have been cited three or more times in the Jihadi writings that were analyzed. The list is divided into modern authors and pre-modern authors. Each list includes the number of times the author has been cited, date of death, and nationality.

DTIC

Leadership; Words (Language); Messages; Calibrating

20070002554 National Cancer Inst., Bethesda, MD, USA

Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary

Howe, H. L.; Wu, X.; Ries, L. A. G.; Cokkinides, V.; Ahmed, F.; January 2006; 32 pp.; In English
Report No.(s): PB2007-102260; No Copyright; Avail.: CASI: [A03](#), Hardcopy

The American Cancer Society (ACS), the Centers for Disease Control and Prevention (CDC), the National Cancer Institute (NCI), and the North American Association of Central Cancer Registries (NAACCR) collaborate annually to assess the status of cancer in the USA. The 1998 report documented the first sustained decline in cancer death rates since the 1930s. Subsequent reports updated information on trends in incidence and death rates and featured timely topics. This report continues the annual update tradition and presents a special section on cancer among U.S. Hispanic/Latino populations, a large and diverse ethnic group whose cancer experience has not been well described until recently as concerns about misclassification and cultural and other differences among various Latino groups and limited population data have restricted national analyses. Although challenges remain, a comprehensive compilation of cancer information for the estimated 39.9 million U.S. Latinos in 2003 is relevant to future directions in cancer control strategies.

NTIS

Cancer; Populations

20070002746 Lawrence Livermore National Lab., Livermore, CA USA

Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS)

Walker, H.; Chou, R. M.; Chubb, K. K.; Schek, J. L.; Oct. 03, 2005; 28 pp.; In English
Report No.(s): DE2006-885372; UCRL-TR-215813; No Copyright; Avail.: National Technical Information Service (NTIS)

The objective of this project is to evaluate existing and emerging Open Geospatial Consortium (OGC) standards for use in LLNL programs that rely heavily on geographic data. OGC standards are intended to facilitate interoperability between geospatial processing systems to avoid duplication of effort, lower development costs, and encourage competition based on improved capability and performance rather than vendor lock-in. Some of these standards appear to be gaining traction in the geospatial data community, the Federal government, DOE and DHS. A serious evaluation of this technology is appropriate at this time due to increasing interest and mandated compliance in the Federal government in some situations. A subset of OGC standards is identified and reviewed with a focus on applications to LLNL programs. Each standard or recommendation reviewed was evaluated in general terms. In addition, for specific programs such as Gen&SIS and NARAC, a specific evaluation was made of several of the standards and how they could be used most effectively. It is also important to evaluate the acceptance of these standards in the commercial arena. The implementation of OGC standards by the largest GIS vendor (ESRI) was reviewed. At present, OGC standards are primary useful in specific situations.

NTIS

Geographic Information Systems; Information Systems; Organizations

20070002799 Department of Justice, Washington, DC, USA

Sentinel Audit II: Status of the Federal Bureau of Investigation's Case Management System

Dec. 2006; 112 pp.; In English

Report No.(s): PB2007-105046; AUDIT-07-03; No Copyright; Avail.: National Technical Information Service (NTIS)

On March 16, 2006, the Federal Bureau of Investigation (FBI) announced that it had awarded a contract to Lockheed Martin Services, Incorporated (Lockheed Martin) to develop the Sentinel information and investigative case management system in 4 phases. The cost of the four phases of the Lockheed contract was \$305 million, and the FBI estimated that it would cost an additional \$120 million to provide various contractor support and staff the FBI's Sentinel Program Office, with the total estimated cost of Sentinel at \$425 million. The initial schedule for the Lockheed Martin contract calls for all phases to be completed in December 2009. The Sentinel project, which uses commercial off-the-shelf components, is intended to provide the FBI with an electronic information management system, automated workflow processes, search capabilities, and information sharing with other law enforcement agencies and the intelligence community. The FBI Director has stated, Sentinel will strengthen the FBI's capabilities by replacing its primarily paper-based reporting system with an electronic system designed for information sharing. Sentinel will support our current priorities, including our number one priority: preventing terrorist attacks. Sentinel follows the FBI's unsuccessful 3-year, \$170 million effort to develop a modern investigative case management system called the Virtual Case File (VCF) as part of the FBI's Trilogy information technology (IT) modernization project. The VCF, and now Sentinel, was intended to provide the FBI with a modern system so that the existing obsolete Automated Case Support (ACS) system could be retired.

NTIS

Information Systems; Management Systems; Sentinel System

20070002867 Office of Management and Budget, Washington, DC, USA

Managing Information Collection and Dissemination, Fiscal Year 2002

January 2002; 161 pp.; In English

Report No.(s): PB2007-103537; No Copyright; Avail.: CASI: [A08](#), Hardcopy

The Paperwork Reduction Act (PRA) provides a framework for ensuring that all of the Federal Government's information collections satisfy a programmatic need, that the information has practical utility, and that the burden on the public of these activities is curtailed. This report provides a broad view of the PRA, its history, and its implementation by the Office of Management and Budget (OMB) and by Federal agencies. The Bush Administration, while recognizing the public benefits of information collections, is committed to reducing needless paperwork burdens and other violations of the Paperwork Reduction Act. In describing the Administration's efforts to reform Federal information policy and improve information resources management of the Federal Government--and fulfilling OMB's obligation to report annually to Congress on the PRA--the report offers a number of findings.

NTIS

Information Dissemination; Information Resources Management; Collection

20070003020 SRI International Corp., Menlo Park, CA USA

Incremental Interpretation

Pereira, Fernando C; Pollack, Martha E; May 1990; 69 pp.; In English

Contract(s)/Grant(s): N00039-84-C-0524

Report No.(s): AD-A458834; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458834>; Avail.: CASI: [A04](#), Hardcopy

The authors present a system for the incremental interpretation of natural-language utterances in context. The main goal of the work is to account for the influences of context on interpretation, while preserving compositionality to the extent possible. To achieve this goal, they introduce a representational device, conditional interpretations, and a rule system for constructing them. Conditional interpretations represent the potential contributions of phrases to the interpretation of an utterance. The rules specify how phrase interpretations are combined and how they are elaborated with respect to context. The control structure defined by the rules determines the points in the interpretation process at which sufficient information becomes available to carry out specific inferential interpretation steps, such as determining the plausibility of particular referential connections or modifier attachments. They have implemented these ideas in Candide, a system for the interactive acquisition of procedural knowledge.

DTIC

Combinatorial Analysis; Data Processing; Knowledge Based Systems; Linguistics; Natural Language (Computers); Natural Language Processing

20070003025 Maryland Univ., College Park, MD USA

Mapping WorldNet Senses to a Lexical Database of Verbs

Green, Rebecca; Pearl, Lisa; Dorr, Bonnie J; Jan 2001; 10 pp.; In English

Contract(s)/Grant(s): MDA9049-C6-1250; N66001-97-C-8540

Report No.(s): AD-A458846; LAMP-TR-061; CS-TR-4206; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458846>; Avail.: CASI: A02, Hardcopy

This paper describes automatic techniques for mapping 9611 semantically classified English verbs to WordNet senses. The verbs were initially grouped into 491 semantic classes based on syntactic categories; they were then mapped into WordNet senses according to three pieces of information: (1) prior probability of WordNet senses; (2) semantic similarity of WordNet senses for verbs within the same category; and (3) probabilistic correlations between WordNet relationship and verb frame data. Our techniques make use of a training set of 1791 disambiguated entries representing 1442 verbs occurring in 167 of the categories. The best results achieved .58 recall and .72 precision, versus a lower bound of .38 recall and .62 precision for assigning the most frequently occurring WordNet sense, and an upper bound of .75 recall and .87 precision for human judgment.

DTIC

Data Bases; English Language; Mapping; Sensory Perception; Words (Language)

20070003028 Maryland Univ., College Park, MD USA

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit

Lee, Chang Ha; Kanungo, Tapas; Feb 2001; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA9049-6C-1250; N660010028910

Report No.(s): AD-A458851; LAMP-TR-062; CAR-TR-959; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458851>; Avail.: CASI: A02, Hardcopy

Tools for visualizing and crating groundtruth and metadata are crucial for document image analysis research. In this paper we describe TrueViz [LK00, KLCB01], which is a tool for visualizing and edition groundtruth/metadata. We first describe the groundtruthing task and the requirements for any interactive groundtruthing tool, Next we describe the system design of TrueViz and discuss how a user can use it to create groundtruth. TrueViz is implemented in the Java programming language and works on various platforms including Windows and Unix. TrueViz reads and stores groundtruth/metadata in XML format, and reads a corresponding image stored in TIFF image file format. Multilingual text editing, display, and search modules based on the Unicode representation for text are also provided. This software is being made available free of charge to researchers.

DTIC

Architecture (Computers); Data Processing; Editing; Image Analysis; Image Processing; Metadata; Texts

20070003043 California Univ., Berkeley, CA USA

A Connectionist Treatment of Grammar for Generation: Relying on Emergents

Ward, Nigel; Jan 1990; 9 pp.; In English

Contract(s)/Grant(s): N00039-88-C-0292; N00014-89-J-3205

Report No.(s): AD-A458873; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458873>; Avail.: CASI: A02,

Hardcopy

Parallel treatment of syntactic considerations in generation promises quality and speed. Parallelism should be used not only for simultaneous processing of several sub-parts of the output but even within single parts. If both types of parallelism are used with incremental generation it becomes unnecessary to build up and manipulate representations of sentence structure the syntactic form of the output can be emergent. FIG is a structured connectionist generator built in this way. Constructions and their constituents are represented in the same network which encodes world knowledge and lexical Knowledge. Grammatical output results from synergy among many constructions simultaneously active at ran-time. FIG incorporates new ways of handling constituency, word order and optional constituents; and simple ways to avoid the problems of instantiation and binding. Syntactic knowledge is expressed in a simple, readable form; this representation straightforwardly defines parts of the network.

DTIC

Grammars; Networks; Synchronism

20070003049 Naval Command, Control and Ocean Surveillance Center, San Diego, CA USA

Overview of Results of the MUC-6 Evaluation

Sundheim, Beth M; Jan 1995; 20 pp.; In English

Report No.(s): AD-A458881; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458881>; Avail.: CASI: A03, Hardcopy

The latest in a series of natural language processing system evaluations was concluded in October 1995 and was the topic of the Sixth Message Understanding Conference (MUC-6) in November. Participants were invited to enter their systems in as many as four different task-oriented evaluations. The Named Entity and Conference tasks entailed Standard Generalized Markup Language (SGML) annotation of texts and were being conducted for the first time. The other two tasks, Template Element and Scenario Template, were information extraction tasks that followed on from the MUC evaluations conducted in previous years. The evolution and design of the MUC- 6 evaluation are discussed in the paper by Grishman and Sundheim in this volume. All except the Scenario Template task are defined independently of any particular domain. This paper surveys the results of the evaluation on each task and, to a more limited extent, across tasks. Discussion of the results for each task is organized generally under the following topics: * Results on task as whole; * Results on some aspects of task; * Performance on 'walkthrough article.' The walkthrough article is an article selected from the test set. Participants were asked to analyze their system's performance on that article and comment on it in their presentations and papers. Permission has been granted by Dow Jones for the full text of the article to be reprinted in this proceedings. It appears in full in the first part of appendix A, and various site reports may contain excerpts from it or annotated versions of it. Also in appendix A are representations of the information contained in the answer key for the walkthrough article for each of the four tasks.

DTIC

Message Processing; Textbooks

20070003051 Language Systems, Inc., Woodland Hills, CA USA

MUC-4 Test Results and Analysis

Montgomery, Christine A; Stalls, Bonnie G; Stumberger, Robert E; Li, Naicong; Belvin, Robert S; Arnaiz, Alfredo; Hirsh, Susan B; Jan 1992; 6 pp.; In English

Contract(s)/Grant(s): N666001-90-C-0192; DAAA15-89-C-0004

Report No.(s): AD-A458883; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458883>; Avail.: CASI: A02, Hardcopy

LSI's overall natural language processing (NLP) objective is the development of a broad coverage, reusable system which is readily transportable to additional domains, applications, and sublanguages in English, as well as providing a foundation for our multilingual work . Our system, called DBG, for Data Base Generator, is comprised of a set of NLP components which have been developed, extended, and rebuilt over a period of some years. The core of the system is an innovative Principle-based parser, using ideas from [1], which we began developing in the course of MUC-3 to replace our previous chart parser. Our approach thus relies on the concept of powerful, robust parsing as the most crucial component in an NLP system . In applying our NLP system to text extraction, our ultimate objective is to develop a high quality text extraction system, where 'high quality ' is defined as scoring above 80% -- a number well beyond any current MUC scores. In line with these NLP objectives, our major focus for MUC-4 was a follow-up to our main 'lesson learned' in MUC-3, which was to acquire a machine-readable dictionary (MRD) and integrate its content into the DBG system. When attempts to acquire the computer-friendly Longmans or one of the Oxford Dictionaries were unsuccessful, we turned to ACL's CD-ROM containing the Collins English Dictionary . The most correct version of the CED on the ACL CD-ROM was apparently developed directly from a medium prepared for the typographer , and unfortunately lacks any documentation of features, fonts, language, etc . The effort of acquiring and integrating the CED was clearly a worthwhile endeavor, since we were able to increase the number of entries i n our lexicon three-fold in a relatively short time (see Table 1) . The increase in lexicon size will benefit all the applications LSI is currently working on.

DTIC

Coding; Data Processing; English Language; Natural Language (Computers)

20070003058 Pennsylvania Univ., Philadelphia, PA USA

Rhetoric as Knowledge

Rambow, Owen; Jan 1993; 5 pp.; In English

Contract(s)/Grant(s): DAAL03-89-C-0031; N00014-90-J-1863

Report No.(s): AD-A458894; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458894>; Avail.: CASI: A01, Hardcopy

A proper assessment of the relation between discourse structure and speaker's communicative intentions requires a better understanding of communicative intentions. This contribution proposes that there is a crucial difference between intending the hearer to entertain a certain belief (or desire, or intention), and intending to affect the strength with which the hearer entertains the belief (or desire, or intention). Rhetoric, if defined as a body of knowledge about how discourse structure affects the strength with which a discourse participant entertains beliefs, desires, and intentions, can be seen to play a precise and crucial role in the planning of discourse.

DTIC

Information Management; Interprocessor Communication; Textbooks

20070003072 Defence Science and Technology Organisation, Edinburgh, Australia

Organisational Structure and Information Technology (IT): Exploring the Implications of IT for Future Military Structures

Fidock, Justin; Jul 2006; 40 pp.; In English

Report No.(s): AD-A458912; DSTO-TR-1898; AR-013-709; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA458912>; Avail.: CASI: A03, Hardcopy

This report provides a conceptual framework for describing organisational structures based on the work of Mintzberg (1979) and Groth (1999), and considers the implications of information technology (IT) for current and future military organisational structures. The various components that influence organisational structure are considered: coordinating mechanisms, design parameters and contingency factors. When combined together these components form various structural configurations. The role of IT in modifying and extending the range of coordinating mechanisms and structural configurations is also described. These configurations and associated components provide a framework within which military organisations can be categorised. This framework is used to describe a current joint operational level headquarters (HQ), and to explore the implications of emerging IT for future HQ.

DTIC

Information Systems; Organizations

20070003073 SRI International Corp., Menlo Park, CA USA

The DARPA/DMA Image Understanding Testbed SYSTEM MANAGER'S MANUAL. Version 2.0

Hanson, Andrew J; Dec 3, 1985; 20 pp.; In English

Contract(s)/Grant(s): MDA903-79-C-0588; MDA903-83-C-0027

Report No.(s): AD-A458913; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458913>; Avail.: CASI: A03,

Hardcopy

This manual is a reference document for system managers who are responsible for maintaining the Image Understanding Testbed software system. It documents procedures for installing the Testbed, customizing the installation to the needs of an individual site, and maintaining the documentation system. Appendices list a variety of sources of maintenance information for the system's hardware and commercial software.

DTIC

Manuals; Systems Management

20070003091 General Accounting Office, Washington, DC USA

Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies

Dec 2006; 40 pp.; In English

Report No.(s): AD-A458938; GAO-07-69; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458938>; Avail.: CASI:

A03, Hardcopy

U.S. government export control agencies have less oversight on exports of controlled information than they do on exports of controlled goods. Commerce's and State's export control requirements and processes provide physical checkpoints on the means and methods companies use to export-controlled goods to help them ensure such exports are made under license terms, but the agencies cannot easily apply these same requirements and processes to exports of controlled information. For example, companies are generally required to report their shipments of export-controlled goods overseas to Customs and Border Protection for exports made under a license, but such reporting is not applicable to export-controlled information. Commerce and State expect individual companies to be responsible for implementing practices to protect exportcontrolled information. One third of the companies we interviewed told us they do not have internal control plans to protect their export-controlled

information, which set requirements for access to such material by foreign employees and visitors. Also, almost half of the company officials we interviewed told us they encounter uncertainties when determining what measures should be included within their internal control plans to help protect export-controlled information. Commerce and State have not fully assessed the risks of companies using a variety of means to protect export-controlled information. The agencies have not used existing resources, such as license data, to help identify the minimal protections for such exports. As companies use a variety of measures for protecting export-controlled information, increased knowledge of the risks associated with such information could improve agency outreach and training efforts, which now offer limited assistance to companies to mitigate those risks. Our internal control standards highlight the identification and management of risk as a key element of an organization's management control program.

DTIC

International Trade; Management Planning; Organizations; Personnel; Protection; Vulnerability

20070003096 Department of the Army, Washington, DC USA

Classification Management Tutorial

Oct 25, 2006; 75 pp.; In English; Original contains color illustrations

Report No.(s): AD-A458946; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458946>; Avail.: CASI: A04, Hardcopy

The purpose of this Classification Management tutorial is to provide detailed supplemental guidance to Original Classification Authorities (OCAs) for the development of USA (US) Army security classification guides (SCGs) or guidance. Army Regulation (AR) 380-5 Department of the Army Information Security Program implements the policies set forth in Executive Order 12958 as amended on 25 March 2003 Classified National Security Information and Department of Defense (DoD) 5200.1-R Information Security Program. It establishes the policies for security classification downgrading declassification and safeguarding of information requiring protection in the interest of national security. Incorporated into AR 380-5 is DoD 5200.1-H Handbook for Writing Security Classification Ordnance November 1999 which states that timely issuance of comprehensive guidance regarding security classification of information concerning any system plan program or project; the unauthorized disclosure of which reasonably could be expected to cause damage to the national security and that precise classification guidance is prerequisite to effective and efficient information security and assures that security resources are expended to protect only that which truly warrants protection in the interests of national security.

DTIC

Classifications; Manuals; Security

20070003128 Naval Postgraduate School, Monterey, CA USA

Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory

Sengupta, Kishore; Jones, Carl R; Jan 1999; 9 pp.; In English

Report No.(s): AD-A458996; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458996>; Avail.: CASI: A02, Hardcopy

Combat organizations are increasingly faced with the challenge to adapt to new and diverse engagements. The pace of change is being accelerated by advances in information technology. This article offers perspectives from organization theory that can serve as design principles for enabling combat organizations to adopt flexible structures to cope with changes in the external environment. The specific design principles articulated are technology-enabled virtual organizations, organizational 'semi-structures,' and anticipating the future by launching probes. The authors discuss the implications of these principles for military organizations.

DTIC

Armed Forces (United States); Combat; Flexibility; Organizations; Self Organizing Systems; Warfare

20070003136 Yale Univ., New Haven, CT USA

Java Implementation of a Single-Database Computationally Symmetric Private Information Retrieval (cSPIR) Protocol

Saint-Jean, Felipe; Jul 28, 2005; 13 pp.; In English

Contract(s)/Grant(s): N00014-04-1-0725

Report No.(s): AD-A459016; YALEU/DCS/TR-1333; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459016>; Avail.: CASI: A03, Hardcopy

Picture the following scenario. Alice is looking for gold in California. What Alice does is look for a place with a little

gold and follow the trace. Now, Alice wants to find gold in a place where no mining patent has been awarded, but many patents have been awarded in California during the gold rush. What Alice does is to walk around California with a GPS and a notebook computer. Whenever she finds a trace of gold she follows it querying if any patent has been awarded in that location. If she finds a trace of gold in a piece of land with no issued patent she can request the patent and start mining for gold. The problem is that she is worried that Bob's Mining Patents Inc., the service she queries the patents from, might cheat on her. Because Bob's knows she is looking for gold in California (Alice said so when signing up for Bob's service), he knows that, if she queries from some location, then there is gold there. So, if she queries a location and there is no patent awarded, Bob may run to the patent office and get the mining patent for that location. This Alice-and-Bob scenario is a basic motivation for Private Information Retrieval: a family of two-party protocols in which one of the parties owns a database, and the other wants to query it with certain privacy restrictions and warranties. Since the PIR problem was posed, different approaches to its solution have been pursued. In the following sections, we will present the general ideas of the variations and proposed solutions to the PIR problem. Then, we will present a collection of basic protocols that allow the implementation of a general-purpose PIR protocol. Finally, we will show details of a particular PIR protocol we have implemented.

DTIC

Data Bases; Information Retrieval; Protocol (Computers)

20070003147 Texas Univ., Arlington, TX USA

Structure Discovery in Sequentially Connected Data

Coble, Jeffrey A; Cook, Diane J; Holder, Lawrence B; Jan 2005; 7 pp.; In English

Contract(s)/Grant(s): F30602-01-2-0570

Report No.(s): AD-A459031; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459031>; Avail.: CASI: A02, Hardcopy

Much of current data mining research is focused on discovering sets of attributes that discriminate data entities into classes, such as shopping trends for a particular demographic group. In contrast, we are working to develop data mining techniques to discover patterns consisting of complex relationships between entities. Our research is particularly applicable to domains in which the data is event driven, such as counter-terrorism intelligence analysis. In this paper we describe an algorithm designed to operate over relational data received incrementally. Our approach includes a mechanism for summarizing discoveries from previous data increments so that the globally best patterns can be computed by examining only the new data increment. We describe a method by which relational dependencies that span across temporal increment boundaries can be efficiently resolved so that additional pattern instances, which do not reside entirely in a single data increment, can be discovered.

DTIC

Data Mining; Data Processing; Information Retrieval

20070003160 Carnegie-Mellon Univ., Pittsburgh, PA USA

Privacy-Preserving Distributed Information Sharing

Kissner, Lea; Jul 2006; 95 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0389; SA4896-10808PG

Report No.(s): AD-A459056; CMU-CS-06-149; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459056>; Avail.: CASI: A05, Hardcopy

In many important applications, a collection of mutually distrustful parties must share information, without compromising their privacy. Currently, these applications are often performed by using some form of a trusted third party (TTP); this TTP receives all players inputs, computes the desired function, and returns the result. However, the level of trust that must be placed in such a TTP is often inadvisable, undesirable, or even illegal. In order to make many applications practical and secure, we must remove the TTP, replacing it with efficient protocols for privacy-preserving distributed information sharing. Thus, in this thesis we explore techniques for privacy-preserving distributed information sharing that are efficient, secure, and applicable to many situations. As an example of privacy-preserving information sharing, we propose efficient techniques for privacy-preserving operations on multisets. By building a framework of multiset operations, employing the mathematical properties of polynomials, we design efficient, secure, and composable methods to enable privacy-preserving computation of the union, intersection, and element reduction operations. Additionally, we address the problem of determining Subset relations, and even use our techniques to evaluate CNF boolean formulae. We then examine the problem of hot item identification and publication. Many applications of this problem require greater efficiency and robustness than any previously-designed secure protocols for this problem. In order to achieve sufficiently efficient protocols for these problems, we define two new privacy properties: owner privacy and data privacy. By designing our protocols to achieve owner and data

privacy, we are able to significantly increase efficiency over our privacy-preserving set operations, while still protecting the privacy of participants.

DTIC

Computer Information Security; Privacy

20070003198 University of Southern California, Marina del Rey, CA USA

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture

Kim, Jihie; Jan 2005; 7 pp.; In English

Contract(s)/Grant(s): NBCHD-03-0010; N66001-03-C-8006

Report No.(s): AD-A459115; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459115>; Avail.: CASI: A02,

Hardcopy

Current knowledge acquisition tools are oblivious to the process or strategy that the user may be following in entering new knowledge, and are unaware of the users' progress during a session. Users have to make up for these shortcomings by keeping track of the status, progress, potential problems, and possible courses of actions by themselves. The author presents a novel extension to existing systems that does the following: (1) keeps track of past problem solving episodes and relates them to user-entered knowledge, (2) assesses the current status of the knowledge and the problem solving using such relations, and (3) provides assistance to the user based on the assessment. The author applied this approach in developing an intelligent assistant for decision making tasks. The resulting interaction shows that the system guides the knowledge authoring process in terms of making the knowledge more useful, adapting the knowledge to dynamic changes over time, and making overall problem solving more successful.

DTIC

Data Acquisition; Decision Support Systems; Knowledge Based Systems; Problem Solving; User Requirements

20070003233 Rutgers - The State Univ., New Brunswick, NJ USA

Rutgers Filtering Work at TREC 2002: Adaptive and Batch

Angelescu, Andrei; Boros, Endre; Lewis, David; Menkov, Vladimir; Neu, David; Kantor, Paul; Jan 2002; 9 pp.; In English

Contract(s)/Grant(s): N00014-92-J-1375

Report No.(s): AD-A459191; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459191>; Avail.: CASI: A02,

Hardcopy

This year at TREC 2002 we participated in the adaptive filtering sub-task of the filtering track with some models for training a Rocchio classifier. Results were poorer than average on the utility type measures. Using simple feature selection produced better than average results on an F-type measure. The key to our approach was the use of pseudojudgments, and an approach to threshold updating. We also participated in the batch filtering sub-task of the filtering track and investigated the use of rank based feature selection techniques in conjunction with a very simple classification rule.

DTIC

Classifications; Information Retrieval

20070003245 Maryland Univ., College Park, MD USA

Parsing and Tagging of Bilingual Dictionary

Ma, Huanfeng; Karagol-Ayan, Burcu; Doermann, David; Oard, Doug; Wang, Jianqiang; Sep 2003; 36 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-00-2-8910; MDA904-02-C-0406

Report No.(s): AD-A459226; LAMP-TR-106; CAR-TR-991; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459226>; Avail.: Defense Technical Information Center (DTIC)

Bilingual dictionaries hold great potential as a source of lexical resources for training and testing automated systems for optical character recognition, machine translation, and cross-language information retrieval. In this paper, we describe a system for extracting term lexicons from printed bilingual dictionaries. Our work was divided into three phases - dictionary segmentation, entry tagging, and generation. In segmentation, pages are divided into logical entries based on structural features learned from selected examples. The extracted entries are associated with functional labels and passed to a tagging module which associates linguistic labels with each word or phrase in the entry. The output of the system is a structure that represents the entries from the dictionary. We have used this approach to parse a variety of dictionaries with both Latin and non-Latin

alphabets, and demonstrate the results of term lexicon generation for retrieval from a collection of French news stories using English queries.

DTIC

Character Recognition; Dictionaries; Information Retrieval; Marking; Parsing Algorithms; Pattern Recognition; Segments; Translating

20070003246 Maryland Univ., College Park, MD USA

Machine Printed Text and Handwriting Identification in Noisy Document Images

Zheng, Yefeng; Li, Huiping; Doermann, David; Sep 2003; 33 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA9049-6C-1250

Report No.(s): AD-A459230; UMIACS-TR-2003-99; LAMP-TR-107; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459230>; Avail.: CASI: A03, Hardcopy

In this paper we address the problem of the identification of text in noisy document images. We are especially focused on segmenting and identifying between handwriting and machine printed text because: 1) handwriting in a document often indicates corrections, additions, or other supplemental information that should be treated differently from the main content, and 2) the segmentation and recognition techniques requested for machine printed and handwritten text are significantly different. A novel aspect of our approach is that we treat noise as a separate class and model noise based on selected features. Trained Fisher classifiers are used to identify machine printed text and handwriting from noise, and we further exploit context to refine the classification. A Markov Random Field (MRF) based approach is used to model the geometrical structure of the printed text, handwriting, and noise to rectify misclassifications. Experimental results show that our approach is robust and can significantly improve page segmentation in noisy document collections.

DTIC

Handwriting; Image Enhancement; Image Processing; Texts

20070003248 Maryland Univ., College Park, MD USA

The Web as a Parallel Corpus

Resnick, Philip; Smith, Noah A; Jul 2002; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): RD-02-5700; N66001-00-2-8910

Report No.(s): AD-A459234; LAMP-TR-089; UMIACS-TR-2002-61; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459234>; Avail.: CASI: A03, Hardcopy

Parallel corpora have become an essential resource for work in multi-lingual natural language processing. In this report, we describe our work using the STRAND system for mining parallel text on the World Wide Web, first reviewing the original algorithm and results and then presenting a set of significant enhancements. These enhancements include the use of supervised learning based on structural features of documents to improve classification performance, a new content-based measure of translational equivalence, and adaptation of the system to take advantage of the Internet Archive for mining parallel text from the Web on a large scale. Finally, the value of these techniques is demonstrated in the construction of a significant parallel corpus for a low-density language pair.

DTIC

Extraction; Information Retrieval; Internets; Strands; Texts; Translating

20070003254 Maryland Univ., College Park, MD USA

Comparing User-assisted and Automatic Query Translation

He, Daqing; Wang, Jianqiang; Oard, Douglas W; Nossal, Michael; Feb 2003; 17 pp.; In English

Contract(s)/Grant(s): MDA9049-C6-1250

Report No.(s): AD-A459243; LAMP-TR-098; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459243>; Avail.:

CASI: A03, Hardcopy

For the 2002 Cross-Language Evaluation Forum Interactive Track, the University of Maryland team focused on query formulation and reformulation. Twelve people performed a total of forty eight searches in the German document collection using English queries. Half of the searches were with user-assisted query translation, and half with fully automatic query translation. For the user-assisted query translation condition, participants were provided two types of cues about the meaning of each translation: a list of other terms with the same translation (potential synonyms) and a sentence in which the word was used in a translation-appropriate context. Four searchers performed the official iCLEF task, the other eight searched a smaller collection. Searchers performing the official task were able to make more accurate relevance judgments with user-assisted

query translation for three of the four topics. We observed that the number of query iterations seems to vary systematically with topic, system, and collection, and we are analyzing query content and ranked retrieval measures to obtain further insight into these variations in search behavior.

DTIC

Information Retrieval; Translating

20070003255 Maryland Univ., College Park, MD USA

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval

Dorr, Bonnie J; Lin, Dekang; Levow, Gina-Anne; Aug 2002; 33 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): MDA904-96-C-1250; N66001-97-C-8540

Report No.(s): AD-A459245; LAMP-TR-093; UMIACS-TR-2002-80; No Copyright; ONLINE:

<http://hdl.handle.net/100.2/ADA459245>; Avail.: CASI: A03, Hardcopy

This paper addresses the problem of automatic acquisition of lexical knowledge for rapid construction of MT engines for use in multilingual applications. We describe new techniques for large-scale construction of a Chinese-English verb lexicon and we evaluate the coverage and effectiveness of the resulting lexicon for a structured MT approach that is embedded in a cross-language information retrieval system. Leveraging off an existing Chinese conceptual database called HowNet and a large, semantically rich English verb database, we use thematic-role information to create links between Chinese concepts and English classes. We apply the metrics of recall and precision to evaluate the coverage and effectiveness of the linguistic resources. The results of this work indicate that: (1) we are able to obtain reliable Chinese-English entries both with and without pre-existing semantic links between the two languages; (2) if we have pre-existing semantic links, we are able to produce a more robust lexical resource by merging these with our semantically rich English database; (3) In our comparisons with manual lexicon creation, our automatic techniques were shown to achieve 62% precision, compared to a much lower precision of 10% for arbitrary assignment of semantic links.

DTIC

Acquisition; China; Construction; Embedding; Information Retrieval; Machine Translation

20070003291 American Bird Conservancy, Washington, DC USA

Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sternula Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005

Lott, Casey A; Pashley, David N; Dec 2006; 33 pp.; In English; Original contains color illustrations

Report No.(s): AD-A459288; ERDC/EL-TR-06-05; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459288>;

Avail.: CASI: A03, Hardcopy

This technical report summarizes a regional workshop on monitoring programs for the Interior Least Tern (ILT) (*Sternula antillarum*) in Tulsa, Oklahoma in November, 2005. Discussions focused on: 1) defining goals and objectives for local, regional, and range-wide monitoring programs; 2) deciding what information to collect during monitoring programs; 3) standardizing data collection and analysis protocols among programs; 4) integrating local efforts into regional or rangewide approaches; and 5) evaluating the effects of management actions on ILT within the context of regional or range-wide recovery. This summary reviews existing monitoring programs and suggests a course of action for developing a range-wide monitoring plan to better evaluate the effects of management on ILT. Consensus was that annual range-wide counts of adults during a standard survey window would be advisable to track longterm changes in ILT population trends and distribution. Participants agreed that data on reproductive success (and how this relates to management) are also necessary to evaluate population health. However, many participants were concerned that estimates of fledglings per pair for Least Terns may be highly inaccurate. Participants agreed on ways to pursue monitoring of nest success (and nest fates) as indices to reproductive performance that could be analyzed versus factors associated with management issues (e.g., flooding on dam controlled rivers, recreation impacts). Two monitoring committees were formed to advise the ILT Working Group in this process.

DTIC

Birds; Data Acquisition; Habitats

20070003298 Massachusetts Inst. of Tech., Cambridge, MA USA

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies

Lee, Jintae; Malone, Thomas W; Sep 1989; 44 pp.; In English

Report No.(s): AD-A459297; SSM-WP-3076-89-MS; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459297>; Avail.: CASI: [A03](#), Hardcopy

Many computer systems are based on various types of messages, forms, or other objects. When users of such systems need to communicate with people who use different object types, some kind of translation is necessary. In this paper, we explore the space of general solutions to this translation problem and propose several specific solutions to it. After first illustrating the problem in the Object Lens system, we identify two partly conflicting objectives that any translation scheme should satisfy: preservation of meaning and autonomous evolution of group languages. Then we partition the space of possible solutions to this problem in terms of the set theoretic relations between group languages and a common language. This leads to five primary solution classes and we illustrate and evaluate each one. Finally, we describe a composite scheme, called Partially Shared Views, that combines many of the best features of the other schemes. A key insight of the analysis is that partially shared type hierarchies allow 'foreign' object types to be automatically translated into their nearest common 'ancestor' types. The partial interoperability attained in this way makes possible flexible standards where people can benefit from whatever agreements they do have without having to agree on everything. Even though our examples deal primarily with extensions to the Object Lens system, the analysis also suggests how other kinds of systems, such as heterogeneous databases or EDI applications, might exploit specialization hierarchies of object types to simplify the translation problem.

DTIC

Group Dynamics; Hierarchies; Interprocessor Communication; Languages; Translating

20070003301 Maryland Univ., College Park, MD USA

TD2-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit

He, Daqing; Park, Hyuk R; Murray, G C; Subotin, Michael; Oard, Douglas W; Feb 2003; 8 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N66001-00-2-8910

Report No.(s): AD-A459303; LAMP-TR-099; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459303>; Avail.:

CASI: [A02](#), Hardcopy

The University of Maryland submitted six topic tracking runs for the 2002 Topic Detection and Tracking evaluation. Two runs were produced using the Lemur language modeling toolkit, the remaining four were produced using a separate system coded in Perl. The Lemur runs outperformed the Perl runs on the required condition because term frequency information was better handled. Two of the Perl runs used native Arabic orthography with two-best translation based on a statistical lexicon, obtaining similar results to those obtained with the Arabic-to-English translations provided with the collection.

DTIC

Models; Programming Languages; Software Development Tools

20070003302 Maryland Univ., College Park, MD USA

Probabilistic Structured Query Methods

Darwish, Kareem; Oard, Douglas W; Feb 2003; 9 pp.; In English

Contract(s)/Grant(s): MDA904-96-C-1250

Report No.(s): AD-A459304; LAMP-TR-102; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459304>; Avail.:

CASI: [A02](#), Hardcopy

Structured methods for query term replacement rely on separate estimates of term frequency and document frequency to compute the weight for each query term. This paper reviews prior work on structured query techniques and introduces three new variants that leverage estimates of replacement probabilities. Statistically significant improvements in retrieval effectiveness are demonstrated for cross-language retrieval and for retrieval based on optical character recognition when replacement probabilities are used to estimate both term frequency and document frequency.

DTIC

Information Retrieval; Probability Theory

20070003334 University of Southern California, Marina del Rey, CA USA

The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning

Adibi, Jafar; Chalupsky, Hans; Melz, Eric; Valente, Andre; Jan 2004; 9 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-01-2-0583

Report No.(s): AD-A459397; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459397>; Avail.: CASI: [A02](#),

Hardcopy

Link discovery is a new challenge in data mining whose primary concerns are to identify strong links and discover hidden relationships among entities and organizations based on low-level, incomplete and noisy evidence data. To address this challenge, we are developing a hybrid link discovery system called KOJAK that combines state-of-the-art knowledge representation and reasoning (KR&R) technology with statistical clustering and analysis techniques from the area of data mining. In this paper we report on the architecture and technology of its first fully completed module called the KOJAK Group Finder. The Group Finder is capable of finding hidden groups and group members in large evidence databases. Our group finding approach addresses a variety of important LD challenges, such as being able to exploit heterogeneous and structurally rich evidence, handling the connectivity curse, noise and corruption as well as the capability to scale up to very large, realistic data sets. The first version of the KOJAK Group Finder has been successfully tested and evaluated on a variety of synthetic datasets.

DTIC

Connectors; Knowledge Based Systems

20070003357 Carnegie-Mellon Univ., Pittsburgh, PA USA

DyNetML: Interchange Format for Rich Social Network Data

Tsvetovat, Maksim; Reminga, Jeff; Carley, Kathleen M; Feb 2004; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-02-1-0973; NSF-ITR-1040059

Report No.(s): AD-A459444; CMU-ISRI-04-105; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA459444>; Avail.:

Defense Technical Information Center (DTIC)

The authors define a universal data interchange format to enable the exchange of rich social network data and to improve the compatibility of analysis and visualization tools. DyNetML is an XML-derived language that provides a means to express rich social network data. DyNetML also provides an extensible facility for linking anthropological, process description, and other data with social networks. DyNetML has been implemented and in use by the CASOS group at Carnegie Mellon University as a data interchange format. The authors also have implemented parsing and conversion software for interoperability with other software packages

DTIC

Data Management; Format; Human Relations; Networks

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*.

20070002619 NASA Marshall Space Flight Center, Huntsville, AL, USA

Aerocapture Benefits to Future Science Missions

Artis, Gwen; James, Bonnie; [2006]; 17 pp.; In English; Division for Planetary Sciences Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002619>;

Avail.: CASI: **A03**, Hardcopy

NASA's In-Space Propulsion Technology (ISPT) Program is investing in technologies to revolutionize the robotic exploration of deep space. One of these technologies is Aerocapture, the most promising of the 'aeroassist' techniques used to maneuver a space vehicle within an atmosphere, using aerodynamic forces in lieu of propellant. (Other aeroassist techniques include aeroentry and aerobraking.) Aerocapture relies on drag atmospheric drag to decelerate an incoming spacecraft and capture it into orbit. This technique is very attractive since it permits spacecraft to be launched from Earth at higher velocities, providing shorter trip times and saving mass and overall cost on future missions. Recent aerocapture systems analysis studies quantify the benefits of aerocapture to future exploration. The 2002 Titan aerocapture study showed that using aerocapture at Titan instead of conventional propulsive capture results in over twice as much payload delivered to Titan. Aerocapture at Venus results in almost twice the payload delivered to Venus as with aerobraking, and over six times more mass delivered into orbit than all-propulsive capture. Aerocapture at Mars shows significant benefits as the payload sizes increase and as missions become more complex. Recent Neptune aerocapture studies show that aerocapture opens up entirely new classes of missions at Neptune. Current aerocapture technology development is advancing the maturity of each subsystem technology needed for successful implementation of aerocapture on future missions. Recent development has focused on both rigid aeroshell and inflatable aerocapture systems. Rigid aeroshell systems development includes new ablative and non-ablative thermal protection systems, advanced aeroshell performance sensors, lightweight structures and higher temperature adhesives.

Inflatable systems such as trailing tethered and clamped 'ballutes' and inflatable aeroshells are also under development. Computational tools required to support future aerocapture missions are an integral part of aerocapture development. Tools include engineering reference atmosphere models, guidance and navigation algorithms, aerothermodynamic modeling, and flight simulation.

Author

Aerocapture; Aerothermodynamics; Flight Simulation; Robotics; Space Exploration; Systems Engineering; Thermal Protection; Atmospheric Models; Aerodynamic Forces

20070003479 NASA Ames Research Center, Moffett Field, CA, USA

The Birth of Planetary Systems

Lissauer, Jack J.; [1997]; 1 pp.; In English

Contract(s)/Grant(s): RTOP 44-20-50-01; No Copyright; Avail.: Other Sources; Abstract Only

Models of planet formation and of the orbital stability of planetary systems are described and used to discuss possible characteristics of undiscovered planetary systems. Modern theories of star and planet formation, which are based upon observations of the Solar System and of young stars and their environments, predict that rocky planets should form in orbit about most single stars. It is uncertain whether or not gas giant planet formation is common, because most protoplanetary disks may dissipate before solid planetary cores can grow large- enough to gravitationally trap substantial quantities of gas. Another potential hazard to planetary systems is radial decay of planetary orbits resulting from interactions with material within the disk. Planets more massive than Earth have the potential to decay the fastest, and may be able to sweep up smaller planets in their path. The implications of the giant planets found in recent radial velocity searches for the abundances of habitable planets are discussed.

Author

Planetary Evolution; Planetary Systems; Gas Giant Planets; Systems Stability; Solar System; Planetary Orbits; Habitability

20070003480 NASA Ames Research Center, Moffett Field, CA, USA

Reproductive Ontogeny of Wheat Grown on the MIR Space Station

Bubenheim, David L.; Stieber, Joseph; [1997]; 1 pp.; In English; American Society of Gravitational and Space Biology (ASGSB), 19-22 Nov. 1997, Washington, DC, USA; No Copyright; Avail.: Other Sources; Abstract Only

The reproductive ontogeny of 'Super-Dwarf' wheat grown on the space station Mir is chronicled from the vegetative phase through flower development. Changes in the apical meristem associated with transition from the vegetative phase to floral initiation and development of the reproductive spike were all typical of 'Super Dwarf' wheat up to the point of anthesis. Filament elongation, which characteristically occurs just prior to anthesis and moves the anthers through the stigmatic branches thus facilitating pollination, did not occur in the flowers of spikes grown on Mir. While development of spikes on tillers typically occurs later than that of spikes on the main stem, all flowers appear to be arrested at the same developmental point.

Author

Mir Space Station; Wheat; Vegetation; Ontogeny

20070003484 NASA Ames Research Center, Moffett Field, CA, USA

The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars

Borucki, W. J.; Koch, D. G.; Dunham, E. W.; Jenkins, J. M.; [1997]; 1 pp.; In English

Contract(s)/Grant(s): RTOP# 839-88-05; No Copyright; Avail.: Other Sources; Abstract Only

The surprising discovery of giant planets in inner orbits around solar-like stars has brought into question our understanding of the development and evolution of planetary systems, including our solar system. To make further progress, it is critical to detect and obtain data on the frequency and characteristics of Earth-class planets. The Kepler Mission is designed to be a quick, low-cost approach to accomplish that objective. Transits by Earth-class planets produce a fractional change in stellar brightness of 5×10^{-5} to 40×10^{-5} lasting for 4 to 16 hours. From the period and depth of the transits, the orbit and size of the planets can be calculated. The proposed instrument is a one-meter aperture photometer with a 12 deg. field-of-view (FOV). To obtain the required precision and to avoid interruptions caused by day-night and seasonal cycles, the photometer will be launched into a heliocentric orbit. It will continuously and simultaneously monitor the flux from 80,000 dwarf stars brighter than 14th magnitude in the Cygnus constellation. The mission tests the hypothesis that the formation of most stars produces Earth-class planets in inner orbits. Based on this assumption and the recent observations that

2% of the stars have giant planets in inner orbits, several types of results are expected from the mission: 1. From transits of Earth-class planets, about 480 planet detections and 60 cases where two or more planets are found in the same system. 2. From transits of giant planets, about 160 detections of inner-orbit planets and 24 detections of outer-orbit planets. 3. From the phase modulation of the reflected light from giant planets, about 1400 planet detections with periods less than a week, albedos for 160 of these giant planets, and densities for seven planets.

Author

Gas Giant Planets; Planetary Systems; Space Missions; Stellar Evolution

89

ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20070002616 NASA Marshall Space Flight Center, Huntsville, AL, USA

The GLAST Burst Monitor

Meegan, Charles; [2006]; 1 pp.; In English; Recent Developments in the Study of Gamma-ray Bursts, 18-20 Sep. 2006, London, UK; No Copyright; Avail.: Other Sources; Abstract Only

The Gamma Ray Large Area Space Telescope (GLAST) observatory, scheduled for launch in September 2007, comprises the Large Area Telescope (LAT) and the GLAST Burst Monitor (GBM). LAT is a pair telescope that will observe many sources, including gamma-ray bursts, at energies above 20 MeV. GBM consists of twelve NaI and two BGO scintillation detectors operating in the 10 keV to 30 MeV range. The GBM will enhance LAT observations of GRBs by extending the spectral coverage into the range of current GRB databases, and will provide a trigger for re-orienting the spacecraft to observe delayed emission from bursts outside the LAT field of view. GBM capabilities and performance characteristics will be described. Opportunities for guest investigations will be presented.

Author

Gamma Ray Bursts; Hubble Space Telescope; Monitors; Astronomy

20070002920 Gemini Observatory, Hilo, HI, USA

Gemini Focus: Newsletter of the Gemini Observatory

Michaud, Peter, Editor; Fisher, Scott, Editor; Peterson, Carolyn Collins, Editor; Johnson, Rachel, Editor; December 2006; 104 pp.; In English; See also 20070002921 - 20070002941; Copyright; Avail.: Other Sources

This December 2006 Gemini Focus Newsletter contains the following topics: 1) Adaptive Optics: A Core Gemini Program; 2) From Classical Adaptive Optics to MCAO; 3) Gemini's Adaptive Optics Program: An Overview; 4) IRS-8: A Galactic Black Sheep; 5) M31 Star-formation Histories; 6) Studying High-z Galaxies with MCAO; 7) Very Low-mass Binaries; 8) AO Imaging of Quasar Host Galaxies; 9) Science from NIFS System Verification; 10) Hokupa'a: Gemini's First AO System; 11) Gemini's ALTAIR Adaptive Optics System; 12) MCAO at Gemini; 13) Gemini's Laser Guide Star Facility; 14) NIFS at Gemini North; 15) Searching for Planets with NICI; 16) Gemini South's Adaptive Optics Imager; 17) FLAMINGOS-2: A New MOS on the Block; 18) The Gemini Planet Imager; 19) GLAO: A 'Third Gemini'; 20) History of U.S. Adaptive Optics Funding; and 21) Gemini South Science Highlights

CASI

Observatories; Telescopes; Solar System; Star Formation

20070002921 Gemini Observatory, Hilo, HI, USA

Gemini's Laser Guide Star Facility

Sheehan, Michael; dOrgeville, Celine; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 54-59; In English; See also 20070002920; Copyright; Avail.: Other Sources

The Gemini laser guide star facility is a cutting-edge addition to the observatory's adaptive optics systems. It consists of a laser system and all subsystems necessary to project a laser beam into the sky to create a simulated guide star that will help astronomers deal with the effects of atmospheric aberration during observations. The facility has been in operation (commissioning) at Gemini North since May 2005 and components for the Gemini South laser guide star facility are now in various stages of development for deployment in 2007. The Gemini North laser guide star system is attached to the elevation structure of the telescope, housed inside an environmentally controlled clean room. The laser system operates equally well in changing gravity orientations as the telescope moves from the zenith to a minimum altitude of 30 degrees. At Gemini South,

the five-beam multiconjugate adaptive optics (MCAO) laser system is significantly larger and more complex than at Gemini North. To accommodate the bigger Gemini South laser system, a new support structure and a much larger clean room is being designed and will be located near one of the mount access platforms. For both facilities, the beam is transported from the laser exit window to the telescope top-end through a series of static and articulating optics, where it is expanded and launched along the telescope's optical axis.

Derived from text

Adaptive Optics; Laser Guide Stars; Telescopes; Laser Windows

20070002922 National Optical Astronomy Observatories, La Serena, Chile

M31 Star Formation Histories

Olsen, Knut; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 23-26; In English; See also 20070002920; Copyright; Avail.: Other Sources

Behind their facade of invariability, as astronomers often explain, galaxies are in the process of continuous and often violent activity. This statement is decidedly true in the case of the well-known nearby irregular galaxy known as the Large Magellanic Cloud (LMC). At the same time our solar system was forming, the LMC was transitioning from a state of relative slumber to one of frenzied star-formation activity, and possibly creating its characteristic bar structure. Just a few millions of years ago our earliest human ancestors (among the first upright-walking primates on the planet) would have seen a very different LMC from the one we see in the southern hemisphere today. This is because the main engine of star birth in the LMC, the core of the great star-forming complex 30 Doradus, had not yet been born. By contrast, the Andromeda Galaxy, more famous than the LMC and known to most astronomers simply as M31, tells a very different evolutionary story. Our team (Robert Blum, Andrew Stephens, Tim Davidge, Philip Massey, Steve Strom, Francois Rigaut, and the author) has used near-infrared images of M31's bulge and inner disk to make a partial map of the star-formation history of M31 in order to help tell its evolutionary story. We have measured, to within a certain precision, the ages and approximate chemical abundances of all past star-formation events in representative portions of M31.

Derived from text

Infrared Imagery; Star Formation; Galaxies; Bulging; Nebulae; Magellanic Clouds

20070002923 Herzberg Inst. of Astrophysics, Victoria, British Columbia, Canada

Gemini's ALTAIR Adaptive Optics System

Veran, Jean-Pierre; Trujillo, Chad; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 45-47; In English; See also 20070002920; Copyright; Avail.: Other Sources

ALTAIR, the Gemini North facility adaptive optics system, has been in full science operation since early 2004. In its original version, ALTAIR used the light of a natural guide star (NGS) to sense atmospheric turbulence and drive a deformable mirror (DM) to compensate for the distortions to starlight imparted by this turbulence. Because this guide star has to be bright (red magnitude, $m_{\text{sub } g}$) and fairly close to the science target of interest, ALTAIR's sky coverage is quite limited. Recently, two major upgrades have been implemented that greatly relieve this limitation. The first upgrade is the addition of a field lens at the ALTAIR entrance focus. This lens optically re-conjugates the DM to the ground level. In the initial design, the DM was conjugated to 6.5 kilometers (about four miles) above the ground level. However, it turned out that, on average, the turbulence at Mauna Kea is closer to the ground than expected, so that a ground-level conjugation is more optimal. With the field lens, a significant increase in the size of the corrected field was demonstrated in most conditions. This not only enables the acquisition of wider fields, but also increases the sky coverage, since the guide star can be farther away to achieve the same level of correction. A science-grade field lens has now been manufactured and will be implemented soon.

Derived from text

Adaptive Optics; Atmospheric Turbulence; Main Sequence Stars; A Stars; Conjugation; Lenses

20070002924 Herzberg Inst. of Astrophysics, Victoria, British Columbia, Canada

Hokupa'a: Gemini's First AO System

Veran, Jean-Pierre; Trujillo, Chad; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 43-47; In English; See also 20070002920; Copyright; Avail.: Other Sources

A driving mission for the Gemini telescopes has always been to deliver the finest image quality possible from each site. Adaptive optics and diffraction-limited images were an integral part of Gemini's vision from the start, and early in the design process planners recognized that all aspects of the observatory had to be tuned in order to achieve the ultimate resolution possible with the telescopes. The seeds of a unique collaboration between Gemini and the University of Hawaii's Institute for

Astronomy (EA) sprang from these early planning efforts, and led to the use of INS adaptive optics system Hokupa'a and the QUIRC near-infrared camera system on Gemini North. From the observatory's initial conception, subsystems were designed to control the telescope optics, the telescope structure, the dome environment, and the instruments to ensure the best possible image quality. Each of the subsystems had to be held to an accounting system that tracked all possible sources of image quality degradation. Even with this planning, few could imagine that diffraction-limited imaging would be possible during the early commissioning of the Gemini North telescope. With the many challenges facing the young observatory, major subsystems that are now taken for granted, such as the primary mirror active control, were not fully available. Function rather than performance was the priority at that time.

Derived from text

Adaptive Optics; Imaging Techniques; Observatories; Telescopes; Mirrors; Image Resolution; Active Control

20070002925 Gemini Observatory, Hilo, HI, USA

Gemini Adaptive Optics Program: An Overview

Roy, Jean-Rene; Rigaut, Francois; Sheehan, Michael; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 12-19; In English; See also 20070002920; Copyright; Avail.: Other Sources

Following the 1993 optical fix on the Hubble Space Telescope (HST), the power of high spatial resolution has been demonstrated again and again. Ground-based telescopes cannot compete with HST in the optical and ultraviolet windows for fine imaging but can compare and even surpass HST in the near-infrared by using adaptive optics. Hence, AO is central to Gemini's scientific mission with both Gemini telescopes equipped (or soon to be equipped) with superb AO systems. From 1996 to the present, the Gemini Board and partner agencies have repeatedly directed the observatory to develop and maintain an ambitious, extensive and strategic AO program. The Gemini telescopes are unique among the family of large 8- to 10-meter-class telescopes because they are optimized for maximum performance in the infrared. They were designed and built to deliver the finest image quality and highest Strehl ratios allowed by the site conditions, to deliver diffraction-limited images and to have the greatest sensitivities in the thermal infrared achievable on the ground. Beginning in 1997, when we first embarked on building the ALTAIR facility AO system, we established a stepped approach with a succession of well-phased AO systems and instruments capable of producing science at the forefront of astronomical research. The Gemini AO program is a carefully planned succession of facilities that enable AO on both telescopes, and instruments that can exploit the excellent image quality. The AO instruments have included the Hokupa'a-36 system as well as ALTAIR currently on Gemini North, and the multiconjugate adaptive optics (MCAO) system (recently named CANOPUS) now being integrated at Gemini South. The instruments that utilize AO are the Near Infrared Imager (NIRI) and the Near Infrared Integral Field Spectrograph (NIFS) at Gemini North. At Gemini South the Near Infrared Coronagraphic Imager (NICI), Gemini South Adaptive Optics Imager (GSAOI) and FLAMINGOS-2 will all soon be available with AO modes and the Gemini Planet Imager (GPI) will follow with delivery in 2010.

Derived from text

Adaptive Optics; Observatories; Telescopes; General Overviews; Solar System

20070002926 Gemini Observatory, Hilo, HI, USA

MCAO at Gemini

Gratadour, Damien; Rigaut, Francois; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 48-53; In English; See also 20070002920; Copyright; Avail.: Other Sources

Since the early 1990s the emergence of adaptive optics systems has allowed large telescopes (8- to 10-meter-class) to scan both northern and southern skies with the sharpest possible views in the near-infrared. However, the scientific exploitation of such systems is still limited to small regions (10 to 20 arcseconds) around a relatively bright reference source (with visual magnitudes brighter than about 17). Now, imagine an enhanced adaptive optics system that covers a much larger fraction of the sky and provides uniform image compensation over fields significantly larger than the natural isoplanatic patch. This is the aim of the multi-conjugate adaptive optics (MCAO) project that is nearing completion at Gemini South. The advent of MCAO is recent. New adaptive optics system designs were introduced at the beginning of the 21st century to mitigate both the limited sky coverage and the limited field of view. Initially laser guide star systems (still limited by the so-called 'cone effect') were implemented on large telescopes (Lick Observatory Starfire, Gemini, and Keck for instance). More recently, MCAO emerged, with only a few systems currently under development (Gemini, the Very Large Telescope, and the Large Binocular Telescope, for example). The evolution of adaptive optics systems, as well as a comparative case for MCAO are presented in From Adaptive Optics to Multi-conjugate Adaptive Optics starting on page 7 of this special issue of GeminiFocus. Intensive end-to-end adaptive optics simulations have been completed to prove the concept of MCAO and select the most

efficient possible configuration. This work has led to the final design of the Gemini MCAO system.

Derived from text

Adaptive Optics; Laser Guide Stars; Systems Engineering; Observatories; Field of View; Conjugates

20070002927 Gemini Observatory, Hilo, HI, USA

Gemini South Adaptive Optics Imager

Simons, Douglas; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 67-68; In English; See also 20070002920; Copyright; Avail.: Other Sources

Among the last of the Phase 2 instruments scheduled to arrive at Gemini is the Gemini South Adaptive Optics Imager. Built by Australia National University (ANU), this instrument shares a number of design features with other Gemini instruments, but also has some completely unique design aspects. GSAOI uses the same vacuum jacket design as NIRC2 and NIFS and hence, from the outside, looks essentially identical to those other venerable instruments. It also has a similar cold optical bench inside. This approach to 'recycling' design concepts across various Gemini instruments was adopted several years ago in an effort to reduce cost, risk, and complexity in Gemini's instrument program. This is one of the 'hidden' assets of the large international collection of instrument builders working on Gemini's development program. Over time the Observatory has built up a considerable library of designs that are available for use by new instrument teams, including mechanical drawings, optical designs, and control system software. But, that's where the similarities end. GSAOI is a dedicated near-infrared imager and in fact, hosts the single most technically complex (and expensive) focal plane sensor package of any Gemini instrument. It uses a mosaic of four HAWAII-2RG detectors which together critically sample the entire MCAO corrected field.

Derived from text

Optical Control; Adaptive Optics; Imaging Techniques

20070002928 Gemini Observatory, Hilo, HI, USA

Adaptive Optics: A Core Gemini Program

Simons, Douglas; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 4-6; In English; See also 20070002920; Copyright; Avail.: Other Sources

The cover for this edition of GeminiFocus was deliberately chosen to illustrate in no-nonsense terms that we do AO at Gemini Observatory. The Gemini telescopes were designed from the outset to take advantage of the natural seeing conditions available at two of the best sites in the world. Together with the advanced AO systems now in use and under development at Gemini, the sites and technology implemented by the observatory provide our community with truly exciting research opportunities. A remarkable collection of articles which describe the science, technology, and programmatics of Gemini's AO efforts and provide a global context for Gemini's AO program is presented. A wide range of authors provided these articles, which describe the evolution of AO systems used at Gemini from the early days of Hokupa a-36 at Gemini North to the multi-conjugate adaptive optics (MCAO) system now in development for Gemini South and beyond, Instruments designed to be used with AO systems are discussed, including www.gemini.edu the Near Infrared Integral Field Spectrograph (NIFS), Gemini South Adaptive Optics Imager (GSAOI), and FLAMINGOS-2-a near-infrared imager and multi-object spectrograph for Gemini South. We then explore the next-generation of coronagraphs under development within Gemini's instrument program, including the Near-Infrared Coronagraphic Imager (NICI) and the Gemini Planet Imager (GPI). Research completed with Gemini's AO systems is then covered, ranging from planet searches to studies of the center of the Milky Way to observations of distant quasars. Finally a fascinating comparison of astronomical AO investments worldwide is presented. This shows how Gemini's AO investments compare to those made at other major observatories around the world, as well as those of various university-based AO groups.

Derived from text

Adaptive Optics; Observatories; Telescopes; Imaging Techniques

20070002929 Gemini Observatory, Hilo, HI, USA

From Classical Adaptive Optics to MCAO

Gratadour, Damien; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 7-11; In English; See also 20070002920; Copyright; Avail.: Other Sources

Since the astronomer Galileo Galilei first used a refractor to scrutinize the night skies in 1609, astronomers have not ceased in the invention of new ways to discern more details on the celestial sphere. The first approach has often been to increase the size of their observational machines. This worked until certain effects limited the gains realized by increasing

light-gathering power and forced astronomers to invent new designs for their telescopes. For nearly a century after Galileo's first attempt, the size of refractors grew considerably. This allowed astronomers to increase the magnification, which led to two highly limiting effects: chromatic aberration and the size of the telescope itself. Chromatic aberration is due to the separation of light into colors when passing through a lens. It causes a ring of colors to appear around bright objects. Compounding this, between the physical mass of their tube and the lens itself, both can deform under their own weight. Not to mention that heavier instruments are more difficult to manipulate. About eighty years after Galileo's first refractor, Sir Isaac Newton found a solution for these two issues: use mirrors instead of lenses. This new design permitted the same magnification with a telescope ten times more compact and, most importantly, without chromatic aberration. The reflector era had begun.

Derived from text

Adaptive Optics; Telescopes; Refracting Telescopes; Lenses; Magnification; Mirrors; Aberration

20070002930 Gemini Observatory, Hilo, HI, USA

IRS-8 : A Galactic Black Sheep

Geballe, Thomas R.; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 20-22; In English; See also 20070002920; Copyright; Avail.: Other Sources

The centers of large galaxies are likely to contain veritable zoos of astronomical objects and phenomena. This is not surprising because gravitational forces, combined with inelastic interactions between objects, ensure that material makes its way into galactic centers. The nuclei of galaxies contain the densest known clusters of stars, probably host large numbers of white dwarfs and neutron stars, often shroud supermassive black holes, and often there are immense clouds of gas and dust within them as well. Only a limited number of the individual objects in the central few parsecs of distant galaxies can be easily distinguished from our viewpoint, millions of light years away. However, by comparison, the center of our Milky Way Galaxy lies a mere 8,000 parsecs (25,000 light years) from Earth. This is close enough that the detailed distribution of the gas and dust in the central few parsecs has been mapped and astronomers have determined the natures of its brightest stars, which are mostly well resolved from one another. This has been done almost entirely using radio and infrared observations, because dust in the spiral arms between Earth and the center of the Milky Way absorbs all of the visible and ultraviolet radiation emitted in our direction. The advent of adaptive optics on 8- to 10-meter-class telescopes effectively brought infrared astronomers 10 times closer to the Milky Way's center, compared to the views they had before the 1990s. This advance has led to the spectacular precision measurements of the mass of Sgr A*, the supermassive black hole at the very center of our galaxy, using accurate determinations of the orbits of many of the stars within one to two arcseconds (0.1 parsec, about a third of a light-year) of Sgr A*. It also has allowed highly detailed studies of the massive, hot, and windy stars clustered around Sgr A* at slightly larger distances.

Derived from text

Black Holes (Astronomy); Galactic Nuclei; Milky Way Galaxy; Telescopes

20070002931 Hawaii Univ., HI, USA

Science from NIFS System Verification

Chun, Mark; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 40-44; In English; See also 20070002920; Copyright; Avail.: Other Sources

NIFS, the near-infrared integral field spectrograph, is the latest addition to Gemini North's facility instrumentation. It is an adaptive optics-fed IFU spectrograph that delivers imaging spectroscopy at R=5000 in the 1-2.4 micron region of the spectrum at tenth of an arcsecond spatial resolutions. After a short commissioning period in late 2005 (See Gemini North's Near-Infrared Integral Field Spectrograph (NIFS) on page 60 of this issue for commissioning and characteristics), NIFS was ready for system verification observations of its science performance. Six nights of NIFS science verification time were available in three different modes: (1) NIFS + ALTAIR AO-fed IFU spectroscopy (2 nights), (2) NIFS+ALTAIR coronagraphy (2 nights) and (3) NIFS non-AO seeing-limited observations (1 night). To demonstrate the performance of NIFS in each of these modes, observations of a wide range of science programs were carried out in January and February of 2006, from high-redshift galaxies to young binary stars in nearby star forming regions. This article presents a subset of the science highlights from the NIFS science verification.

Author

Adaptive Optics; Binary Stars; Imaging Techniques; Coronagraphs; Galaxies

20070002932 National Astronomical Observatory, Japan

AO Imaging of Quasar Host Galaxies

Guyon, Olivier; Sanders, David B.; Stockton, Alan; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 35-39; In English; See also 20070002920; Copyright; Avail.: Other Sources

Quasar host galaxies are challenging objects to observe due to their small angular size (a few arcseconds for the closest quasars), small apparent luminosity, and the unfavorable contrast between the galaxy and the quasar. Yet, they hold an important clue to understanding quasar formation and evolution: their study is essential to understand why, how and for how long the central black hole is fed material. Quasars are also relevant to galaxy evolution since their existences may be short-duration events in the long lives of galaxies, possibly triggered by galaxy mergers. The host galaxies of quasars can be directly imaged with adaptive optics (AO) in the near-infrared for the following reasons: 1) most nearby quasars are bright enough (with visual magnitudes of about 16) to serve as natural guide stars; 2) the galaxy vs. quasar contrast is most favorable in the near-infrared, where ground-based AO systems operate; 3) near-infrared images of a galaxy provide good tracers of stellar mass (less extinction due to absorption of light than in the visible), therefore providing 'clean' images for morphological studies of the host galaxies.

Derived from text

Adaptive Optics; Infrared Imagery; Electromagnetic Absorption; Black Holes (Astronomy); Stellar Mass; Quasars

20070002933 Arizona Univ., AZ, USA

Very Low-mass Binaries

Close, Lainl M.; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 32-34; In English; See also 20070002920; Copyright; Avail.: Other Sources

Brown dwarfs are low-mass objects that were definitively detected for the first time just over ten years ago. They were the first selfluminous objects found that were too small to shine like normal stars. Little was known about them at the time, other than that they were too low in mass (less than 72 Jupiter masses) to fuse hydrogen. Our understanding of the formation process of such lowmass objects was mainly speculation: they were too massive to form like planets from a circumstellar disk around a star, yet perhaps they were also too low in mass to form from the collapse of an isolated cloud core. Today we know that brown dwarfs can have temperatures and radii similar to those of giant extrasolar planets (many have radii similar to that of Jupiter), and so the detailed study of these objects informs our models of extrasolar planets. Indeed, such extrasolar planets are the primary targets of the next generation of high-contrast imagers (such as the Gemini Planet Imager (GPI), and NASA's Terrestrial Planet Finder). As was true in the case of stars, it is mainly through the study of binaries that we can best determine the precise astrophysical properties of brown dwarfs. Recent results from the study of pairs of very low-mass (VLM) stars and brown dwarfs has truly allowed astronomers to better define the nature of these enigmatic objects. Gemini has played a significant role in this work.

Derived from text

Mass; Brown Dwarf Stars; Astronomy; Adaptive Optics; Observatories

20070002934 Gemini Observatory, Hilo, HI, USA

Searching for Planets with NICI

Jensen, Joseph; Hayward, Tom; Toomey, Doug; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 63-66; In English; See also 20070002920; Copyright; Avail.: Other Sources

With the discovery of more than two hundred planets around other stars, we now stand on the brink of a new understanding of the universe and of our place in it. After centuries of debate, speculation, and many false starts and erroneous claims, a population of extrasolar planets has finally been identified in the last decade. In addition to these exciting and fundamental discoveries, we have obtained a few glimpses into the intermediate stages that link the birth of stars to the formation of planetary systems. We are poised now for the transition from discovery of these systems to their characterization. At Gemini we have large-aperture telescopes optimized for high spatial resolution and infrared sensitivity, equipped with advanced adaptive optics (AO) systems and advanced detectors and instrumentation. The Near-infrared Coronagraphic Imager (NICI) is the first Gemini instrument designed specifically to search for and analyze the properties of planets orbiting other stars, and one of the first in the world optimized to image the light from the planets directly. The primary challenge of extrasolar planet imaging is to separate a planet's very faint light from the light of its much brighter parent star. To do this, the light from each object must be confined to as small an area as possible, much smaller than usually permitted by our own planet's turbulent atmosphere. This is a job for adaptive optics. Several teams have used Gemini's AO systems (Hokupa'a initially, and more recently ALTAIR - see articles on pages 43 and 45 of this issue for more details) to search for hint companions around nearby stars. While these studies have yet to pay off with the discovery of a bona fide planet, they have turned up a number of brown dwarfs. In addition, they have helped to develop the observing techniques and data reduction procedures that will enable planet discoveries.

Derived from text

Coronagraphs; Near Infrared Radiation; Adaptive Optics; Extrasolar Planets; Imaging Techniques

20070002935 Gemini Observatory, Hilo, HI, USA

Studying High-z Galaxies with MCAO

Jorgensen, Inger; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 27-31; In English; See also 20070002920; Copyright; Avail.: Other Sources

One of the large ongoing research projects at Gemini is known as the Gemini/ HST Galaxy Cluster Project. A bold undertaking that uses imaging from the Hubble Space Telescope and multi-object spectroscopy from both GMOS North and South, this project has the primary goal of mapping the star formation history of galaxy clusters between redshift one and the present. The most recent results from the project are described in this article, a study of two clusters at redshifts of 0.8 to 0.9. When observing targets at these relatively modest distances, the instrument of choice is GMOS, since the diagnostic features used in the project lie in the optical at these redshifts. However, there is a very compelling reason for expanding this project to use MCAO. Namely, by studying clusters in the near-infrared we can reach targets at higher redshifts (and therefore larger distances). In particular, we want to extend the project to redshifts between $z = 1$ to 2 where it appears that large changes in the amount of star formation occurred. The results presented in this article show that these changes are strongly correlated with galaxy mass.

Derived from text

Galactic Clusters; Hubble Space Telescope; Spectroscopy; Astronomy

20070002936 Durham Univ., UK

Ground Layer AO (GLAO): A 'Third Gemini'

Myers, Richard; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 77-81; In English; See also 20070002920; Copyright; Avail.: Other Sources

The existence of a third Gemini is a somewhat startling claim that refers to the possible gains in observing efficiency that could be achieved by installing a specialized type of adaptive optics system on the Gemini telescopes. This summary article explains the difference between the ground layer adaptive optics (GLAO) technique and the other types of adaptive optics (AO) systems already familiar to many Gemini observers. In particular, we summarize the results of a feasibility study which Gemini has conducted on the possibilities for implementing GLAO. We also describe the ongoing characterization of the Gemini North site to quantify its suitability for GLAO.

Derived from text

Adaptive Optics; Telescopes; Ground Support Systems; Observatories

20070002937 Association of Universities for Research in Astronomy, Inc., USA

History of U.S. Adaptive Optics Funding

Frogel, Jay A.; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 82-93; In English; See also 20070002920; Copyright; Avail.: Other Sources

My purpose in this article is to examine public and private funding for adaptive optics (AO) research and development (R&D), systems, and instrumentation in the USA. I will concentrate on the period from 1995 through, 2006 with projections through 2009. AO funding during this time period is spread over at least one dozen telescopes and institutions although the bulk of it goes to just a few of these. Private observatories receive close to 60% of all AO funds. The other approx.40% goes to public observatories and institutions for work that is of immediate benefit to the entire community. I also determined that by 2009, expenditures on AO by ESO for the VLT alone will be three- to four-times higher than similar expenditures in the U.S. for all telescopes, public and private.

Derived from text

Adaptive Optics; Telescopes; Costs

20070002938 Gemini Observatory, Hilo, HI, USA

Gemini South Science Highlights

Roy, Jean-Rene; Fisher, Scott; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 94-97; In English; See also 20070002920; Copyright; Avail.: Other Sources

With this issue's focus on adaptive optics, all of the science highlights presented in this special GeminiFocus issue prior to this article have been from Gemini North since Gemini South's AO system is pending integration over the next 12-18 months. Of course astronomers have been using Gemini South for a wide variety of observations, with subjects of interest

ranging from star formation in nearby galaxies to the haunting deaths of stars similar to the Sun. Here are a few highlights from the past six months.

Derived from text

Telescopes; Observatories; Adaptive Optics; Planetary Systems

20070002939 Gemini Observatory, Hilo, HI, USA

NIFS at Gemini North

Beck, Tracy; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 60-62; In English; See also 20070002920; Copyright; Avail.: Other Sources

In March 1999 Gemini Observatory held a meeting to discuss ways to fill the gaps in its suite of optical and infrared instrumentation. From this meeting came the concept of the Near Infrared Integral Field Spectrograph (NIFS). Near infrared imaging spectroscopy was identified as the primary role of NIFS. From the start, it was characterized as a fast-track niche instrument that could provide resolved near-infrared spectroscopy of astronomical targets at adaptive optics-fed spatial resolutions of about a tenth of an arcsecond. Peter McGregor (NIFS principal investigator (PI)) and the instrumentation team at the Research School of Astronomy and Astrophysics (RSAA) at the Australian National University (ANU) in Canberra, Australia was selected to build NIFS. NIFS was designed to be used primarily with Gemini North's facility adaptive optics (AO) system, ALTAIR. Its key capabilities are the high spatial resolution IFU covering a 3 x 3 arcsecond square field, with a moderate-resolution (R-5000) spectrograph in the 0.95-2.4 micron wavelength range. NIFS was designed to excel at high angular resolution observations of spatially extended targets, particularly complex regions that have a high surface brightness, extended narrow emission line regions, or spatially extended emission components. Thus, a core science goal for NIFS is to study the demographics of massive black holes in nearby galactic nuclei, and discern the structure and kinematics of the inner narrow-line regions of nearby Seyfert galaxies. Additionally, NIFS has several occulting disks in the focal plane unit that permit high contrast observations to search for faint companions or spatially extended structure in the vicinity of very bright targets.

Derived from text

Near Infrared Radiation; Observatories; Spectrographs; Adaptive Optics; Astrophysics; Telescopes

20070002940 Gemini Observatory, Hilo, HI, USA

FLAMINGOS-2: A New MOS on the Block

Bergmann, Marcel; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 69-72; In English; See also 20070002920; Copyright; Avail.: Other Sources

The twin Gemini Multi-Object Spectrographs (GMOS-North and GMOS-South) are getting a new sibling: FLAMINGOS-2, the FLoridA Multi-object Imaging Near-infrared Grism Observational Spectrometer-2. The instrument is currently under construction in the astronomy department of the University of Florida, and builds on the legacy of the original FLAMINGOS www.gemini.edu spectrograph that has been in use for many years at the Kitt Peak 4-meter telescope, Gemini South and the Multiple Mirror Telescope. When it is commissioned in early 2007, FLAMINGOS-2 will provide both near-infrared imaging capability and low-resolution multi-object spectroscopy (MOS) in the near-infrared, and can be fed with either the standard (active optics corrected) f/16 beam, or the soon-to-be-delivered multi-conjugate adaptive optics (MCAO) beam.

Derived from text

Spectrographs; Imaging Spectrometers; Adaptive Optics; Image Resolution; Mirrors; Telescopes

20070002941 Lawrence Livermore National Lab., Livermore, CA, USA

The Gemini Planet Imager

Macintosh, Bruce; FROM; Gemini Focus: Newsletter of the Gemini Observatory; December 2006, pp. 73-76; In English; See also 20070002920; Copyright; Avail.: Other Sources

The Extreme Adaptive Optics Coronagraph was identified by the Gemini user communities during the Aspen Process as one of four next-generation instruments for Gemini. It was conceived as a high-performance adaptive optics (AO) system optimized for delivering images of very high contrast at small angular separations that would be suitable for detecting extra solar planets. Now more euphoniously and functionally named the Gemini Planet Imager (GPI), it is the first of the Aspen process instruments to enter the design and construction phase. The primary science mission of GPI is to detect self-luminous extrasolar planets at near-infrared wavelengths. Detecting an old, cold Jupiter-like planet, which is a billion times fainter than the Sun at visible and near-infrared wavelengths, would be challenging even for a 30-meter telescope. However, a young (100

million-year-old) Jovian-mass planet retains the heat of its initial formation and is only a million times dimmer than its parent star in the near-infrared. More massive planets start hotter and cool more slowly and so remain significantly self-luminous for up to one billion years. Such faint companions are still undetectable by the Hubble Space Telescope or current-generation AO systems at separations less than a few arc seconds since they are hidden by light scattered by optical errors, diffraction, and imperfect AO correction of atmospheric turbulence.

Derived from text

Coronagraphs; Adaptive Optics; Extrasolar Planets; Detection; Gas Giant Planets

20070003039 Smithsonian Astrophysical Observatory, Cambridge, MA USA

Cepheids in Multiple Systems: ADS 14859

Evans, Nancy R; Franz, Otto; Massa, Derck; Mason, Brian; Walker, Richard L; Karovska, Margarita; Nov 2006; 6 pp.; In English

Report No.(s): AD-A458867; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458867>; Avail.: CASI: [A02](#), Hardcopy

We have attempted to resolve the system containing the Cepheid V1334 Cyg (= ADS 14859) using both the Faint Object Camera (FOC) and the Fine Guidance Sensor (FGS) on the Hubble Space Telescope, and also using ground-based speckle interferometry with 4 m class instruments. None of these approaches was successful, leading to upper limits of approximately 20 mas (depending on the magnitude difference between the stars). We discuss constraints this places on a possible wide orbit as a guide to future observations.

DTIC

Cepheid Variables; Optical Measuring Instruments; Speckle Interferometry; Telescopes; Variable Stars

20070003040 Naval Observatory, Washington, DC USA

On the Search for Transits of the Planets Orbiting Gliese 876

Shankland, P D; Rivera, E J; Price, A; Ringwald, F; Henry, G W; McGee, P; Carter, B; Lee, S; Biggs, J; Monard, B; Dec 10, 2006; 9 pp.; In English

Report No.(s): AD-A458868; No Copyright; ONLINE: <http://hdl.handle.net/100.2/ADA458868>; Avail.: CASI: [A02](#), Hardcopy

We report the results of a globally coordinated photometric campaign to search for transits by the P~30 day and P~60 day outer planets of the three-planet system orbiting the nearby M dwarf Gl 876. These two planets experience strong mutual perturbations, which necessitate the use of a dynamical (four-body) model to compute transit ephemerides for the system. Our photometric data have been collected from published archival sources, as well as from our photometric campaigns that were targeted to specific transit predictions. Our analysis indicates that transits by planet c (P~30 days) do not currently occur, in concordance with the best-fit $i=50$ degrees coplanar configuration obtained by dynamical fits to the most recent radial velocity data for the system. Transits by planet b (P~60 day) are not entirely ruled out by our observations, but our data indicate that it is very unlikely that they occur. Our experience with the Gl 876 system suggests that a distributed ground-based network of small telescopes can be used to search for transits of very low mass M stars by terrestrial-sized planets.

DTIC

Dwarf Stars; Gas Giant Planets; Optical Measuring Instruments; Orbits; Planets; Telescopes

20070003451 Academia Sinica, Shanghai, China

Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27

Hu, Xiaogong, Editor; Zheng, Weimin, Editor; Shao, Zhengyi, Editor; Wan, Ningshan, Editor; 2006; 146 pp.; In Chinese; See also 20070003452 - 20070003467; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The Annals of Shanghai Observatory Academia Sinica includes the following topics: 1) The scientific research and technical work of Shanghai Astronomical Observatory in 2005; 2) The new SLR ephemeris and its application to predicting satellite; 3) Ocean tide models' performance in coastal regions; 4) Relative deformation rates between co-located VLBI stations and its comparison with VTRF2005; 5) Monitoring the ionospheric TEC variations over Yangtze Delat region; 6) Satellite laser ranging observations at shanghai astronomical observatory in 2005 Satellite laser ranging technique and application group at Shanghai Astronomical observatory; 7) Determining the distance of open cluster M11 from the pure kinematical observational data; 8) Membership and spatial motion of young open cluster NGC 2244; 9) Luminosity function and segregation effect of the open cluster NGC 6530; 10) Research on the sampling offset about satellite navigation receiver; 11) The analysis and test of phase calibration; 12) Parallel bootstrap method of hydrogen atomic clock CAT system based on

DSP; 13) A report on getter pump for hydrogen maser; 14) Software realization method of extracting VLBI phase calibration signal; 15) GPS radio occultation data processing system; and 16) Screen processing for satellite laser ranging at high repetition rate.

CASI

Astronomical Observatories; China; Radio Astronomy

20070003452 Shanghai Astronomical Observatory, China

Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data

Zhao, Junling; Chen, Li; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 47-53; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

On the basis of reasonable supposing that the internal random motions of member stars in a cluster are of isotropic distribution, an approach to determine the distances of open star clusters from pure kinematical observational data including line-of-sight velocities and proper motions is developed, which is an absolute distance measurement technique and completely independent of the luminosity distance of clusters obtained from the relative distance measurement. Using this approach, the velocity distance of the open cluster M11 is determined to be (1.89 ± 0.52) kpc, which is in good agreement with the luminosity distances of the cluster derived from different authors. Some problems concerned are also discussed brief.

Author

Open Clusters; Distance; Kinematics; Luminosity; Star Clusters

20070003453 Shanghai Astronomical Observatory, China

A Report on Getter Pump for Hydrogen Maser

Yang, Hao; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 100-106; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

This paper describes the principle and configuration of the getter pump, introduces the application of the getter pump in the hydrogen maser, and a suggestion on a getter pump application in the hydrogen maser of Shanghai Observatory is also presented.

Author

Getters; Hydrogen Masers; Pumps

20070003454 Shanghai Astronomical Observatory, China

The Scientific Research and Technical Work of Shanghai Astronomical Observatory in 2005

Hong, Xiaoyu; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 1-7; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

In this paper, the scientific research, technical work and so on of Shanghai Astronomical Observatory in 2005 is briefly reviewed.

Author

Astronomical Observatories; Education; Research and Development

20070003455 Shanghai Astronomical Observatory, China

Screen Processing for Satellite Laser Ranging at High Repetition Rate

Sun, Baosan; Zhang, Zhongping; Yang, Fumin; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 129-135; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

We process the data of SLR at high repetition rate by introducing the screen-displaying and mathematical analytical method, through which one can eliminate the illegal and exceptional SLR data brought at the observation, and pick up the useful data. In the end, normal points are created. Using the SLR data at high repetition rate from the GRAZ station at Austria, we show that the method we proposed in this paper is useful and feasible.

Author

Satellite Laser Ranging; Rates (Per Time); Display Devices; Screens; Applications of Mathematics

20070003456 Shanghai Astronomical Observatory, China

Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005

Yang, Zhigen; Shu, Fengchun; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 26-32; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

The data of the relative deformation rates between stations in six co-located VLBI sites were used to compare with corresponding results obtained from solutions of the recent VLBI Terrestrial Reference Frame 2005 (VTRF2005). Comparisons led to the conclusions that the relative vertical deformation rates of 3 to approx. 4 mm/a between NRA020 and NRA085_3 stations and of 1 to approx. 2 mm/a between HAYSTACK and WESTFORD stations are re-confirmed. The relative horizontal deformation rates of 2 to approx. 5 mm/a between KOKEE and KAUAI stations as well as that of 1 to approx. 2 mm/a between KASHIMA and KASHIM34 stations are basically confirmed. However, a relative vertical deformation of about 2 to approx. 4 mm/a between the KASHIMA and KASHIM34 stations, which has been confirmed in the previous studies, disappears in the VTRF2005. Some discussions are addressed.

Author

Coordinates; Deformation; Very Long Base Interferometry; Rates (Per Time)

20070003457 Shanghai Astronomical Observatory, China

GPS Radio Occultation Data Processing System

Guo, Peng; Xu, Huizuo; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 118-128; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

Radio occultation technique can provide profiles of the Earth's ionosphere and neutral atmosphere with high accuracy, high vertical resolution and global coverage. It has advantages of all weather capability, low expense, long-term stability etc. The first GPS/MET experiment MicroLabl demonstrated the potential of GPS radio occultation technique for a global monitoring Earth's atmosphere during the period of time from April 1995 to March 1997. This paper introduces GPS radio occultation data processing system, and occultation data processing at the COSMIC Data Analysis and Archival Center (CDAAC) in the University Corporation for Atmospheric Research (UCAR). It can be used for reference to develop Chinese GPS occultation plan.

Author

Data Processing Equipment; Global Positioning System; Radio Occultation; Earth Atmosphere

20070003458 Shanghai Astronomical Observatory, China

Research on the Sampling Offset about Satellite Navigation Receiver

Cai, Fan; Zhang, Xiuzhong; Yin, Yan; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 69-82; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

This paper carefully researches on code-tracking loop in satellite navigation receivers and mainly refers to the principle of phase locked loop (PLL), digital loop filter, delay-early locked loop (DLL) and the realization of DLL. The simulation of the realization on DLL is done.

Author

Digital Filters; Phase Locked Systems; Simulation; Satellite Navigation Systems

20070003459 Shanghai Astronomical Observatory, China

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP

An, Yan; Liu, Tiexin; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 92-99; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

Based on the device about DSP, the program is always preserved in nonvolatile memory to avoid the program lost once power is off, when system is reset, the program is bootloaded to RAM of DSP. Technology and methods of online programming for DSP + FLASH are presented here. Then this paper discusses how to make a Boot table and program it to FLASH. 16-bit parallel bootload method is major described in this paper. The method introduced can be simulated in error signal processing circuit of hydrogen atomic clock CAT system. Key words astronomical facilities and technique - DSP - bootload - hydrogen atomic clock - online programming - CAT(cavity-auto-tuning) system

Author

Atomic Clocks; Error Signals; Signal Processing; Circuits; Astronomy; Hydrogen

20070003460 Shanghai Astronomical Observatory, China

The New SLR Ephemeris and its Application to Predicting Satellites

Zhang, Haifeng; Zhang, Zhongping; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 8-16; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

The present 'Tuned IRV' ephemeris have been used for nearly 20 years by Satellites Laser Ranging stations. Recently with

the range to high orbit satellites and the laser ranging on daytime being in progress ; and besides, considering the development of SLR technology in the future, the SLR ephemeris should be improved to meet the future development. At the beginning of August of 2006 a new kind of ephemeris, CPF ephemeris, which is adaptive to ranging to kinds of objects will be used by the ILRS. The new ephemeris would be applied not only to SLR, but also ranging to the moon and transponders. This paper introduces this new ephemeris format and applies it to predicting satellite position and then analyses CPF ephemeris prediction accuracy.

Author

Laser Ranging; Artificial Satellites; Predictions; Ranging; Ephemerides

20070003462 Shanghai Astronomical Observatory, China

Membership and Spatial Motion of Young Open Cluster NGC 2244

Chen, Li; Gao, Jianyun; Wang, Jiayi; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 54-60; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

Based on the absolute proper motion data, membership probabilities of stars in the region of very young open cluster NGC 2244 are determined. Based on the membership results, some spatial and kinematical properties of the cluster were discussed and the projected radius of NGC 2244 is obtained. Combined with the mean radial velocity and distance of the cluster, from the literature, the 3-D spatial velocity of NGC 2244 is also derived.

Author

Open Clusters; Star Clusters; Stellar Motions; Radial Velocity

20070003463 Shanghai Astronomical Observatory, China

Luminosity Function and Segregation Effect of the Open Cluster NGC 6530

Zhao, Junliang; Wen, Wen; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 61-68; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

Using the observational data of the open cluster NGC 6530 of Shanghai Astronomical Observatory and the proper motion membership determined on the basis of the data, the luminosity function of the cluster is given and its mass segregation effect is discussed in some details. From analyses on the luminosity functions of members in different areas of the cluster, the radial number density profiles of members with different masses and the half-mass or half-light radii of various mass or magnitude groups of members, it is shown that there exists the spatial mass segregation for the cluster, but there are no definitive evidences to demonstrate the velocity-mass dependence or the velocity mass segregation of cluster members, from which it may be concluded that the apparent spatial mass segregation of the cluster is very likely mainly due to the initial conditions when the cluster formed instead of the two-body relaxation process afterwards.

Author

Astronomical Observatories; Open Clusters; Luminosity

20070003464 Shanghai Astronomical Observatory, China

Software Realization Method of Extracting VLBI Phase Calibration Signal

Yang, Yan; Zheng, Weimin; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 107-117; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

It is an important part of VLBI correlation processing to detect the phase calibration (PCAL) signal, which can be used to eliminate system delay errors caused by instrument. Firstly the basic principle and algorithm of PCAL signal detection is studied, and then some methods of parallel computation for algorithm optimization are discussed. Finally, the software realization method is described. A software has been developed to extract 4-station multi-channel PCAL signals and it will be applied to the ongoing Chinese lunar exploration project.

Author

Calibrating; Extraction; Very Long Base Interferometry; Computer Programs; Signal Detection

20070003465 Shanghai Astronomical Observatory, China

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region

Han, Ling; Zhang, Hongping; Ping, Jingsong; Zhu, Wenyao; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 33-42; In English; See also 20070003451; Copyright; Avail.: Other Sources

Dual frequency GPS observation can be used to monitor ionospheric Total Electron Content (TEC) distribution and variation above a region. From the distributive variations of the obtained ionospheric TEC, ionospheric irregularities of

different scales can be investigated. This paper attempts to study the variations and actions (activities) of the ionospheric TEC above Yangtze Delta by using a span of one-year series of absolute TEC, which is obtained from Shanghai Comprehensive GPS Application Network (SCGAN) in 2004. From the TEC data, the diurnal, seasonal, annual variations of ionosphere above Yangtze Delta region were analyzed and discussed. Meanwhile, by using several kinds of data processing methods, such as Gauss weight function and running smoothing, the parts of the major trend has been separated from the high frequency changing series. These data can be used for qualitative research of relative variations of ionospheric TEC, so as to reveal the small scale and medium scale ionospheric disturbances.

Author

Ionospheric Disturbances; Global Positioning System; Algorithms; Diurnal Variations; Annual Variations

20070003466 Shanghai Astronomical Observatory, China

Satellite Laser Ranging Observations at the Shanghai Astronomical Observatory in 2005

Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 43-46; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

This is a report on satellite laser ranging observations at Shanghai Astronomical Observatory in 2005. The 1054 passes are obtained. It is also reported that the shanghai SLR station has been moved from the foot to the top of the hill of Zo-Se, and normal SLR observations at the new station have started.

Author

Astronomical Observatories; Satellite Laser Ranging; Tracking Stations

20070003467 Shanghai Astronomical Observatory, China

The Analysis and Test of Phase Calibration

Wang, Jinqing; Wei, Wenren; Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27; 2006, pp. 83-91; In Chinese; See also 20070003451; Copyright; Avail.: Other Sources

In this paper, the principles of circuit, mathematics and result of phase calibration (P-CAL) are described in detail. In circuit principle section, the operating principle of P-CAL, the waves of key points and classic tunnel diode circuits are introduced. The Mathematical principle based on which the measurement of comb spectral line is taken is described. At last, some requirements and result of the testing are given out.

Author

Line Spectra; P Waves; Fourier Transformation; Subjects; Calibrating

90

ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20070002527 NASA Marshall Space Flight Center, Huntsville, AL, USA

GRMHD Simulations of Jet Formation with RAISHIN

Mizuno, Y.; Hartmann, D. H.; Nishikawa, K.-I.; Koide, S.; Hardee, P.; Fishman, G. J.; [2006]; 1 pp.; In English; The 6th INTEGRAL Workshop: The Obscured Universe, 2-8 Jul. 2006, Moscow, Russia; Copyright; Avail.: Other Sources; Abstract Only

We have developed a new three dimensional general relativistic magnetohydrodynamic (GRMHD) code, RAISHIN, using a conservative, high-resolution shock capturing scheme. Numerical fluxes are calculated using the Harten, Lax, & van Leer (HLL) approximate Riemann solver scheme. The flux-interpolated, constrained transport scheme is used to maintain a divergence-free magnetic field. We describe code performance on some test problems in both special and general relativity. Our new GRMHD code has proven to be accurate to second order and has successfully passed several numerical test problems including highly relativistic and magnetized tests in both special and general relativity. We have performed several simulations of non-rotating and rotating black hole systems with a geometrically thin accretion disk. The simulations show the formation of jets driven by the Lorentz force and the gas pressure. It appears that the rotating black hole creates an additional faster, and more collimated outflow inside a broader, slower outflow that is also generated by the rotating accretion disk around a non-rotating black hole. The kinematic jet structure could thus be a sensitive function of black hole rotation.

Author

Magnetohydrodynamic Simulation; Relativity; Black Holes (Astronomy); Astrophysics

20070002765 Lawrence Livermore National Lab., Livermore, CA USA

Current Advances in the Computational Simulation of the Formation of Low-Mass Stars

Klein, R. I.; Inutsuka, S.; Padoan, P.; Tomisaka, K.; Oct. 25, 2005; 24 pp.; In English

Report No.(s): DE2006-885394; UCRL-PROC-216517; No Copyright; Avail.: Department of Energy Information Bridge

Developing a theory of low-mass star formation ((approx) 0.1 to 3 M_{\odot}) remains one of the most elusive and important goals of theoretical astrophysics. The star-formation process is the outcome of the complex dynamics of interstellar gas involving non-linear interactions of turbulence, gravity, magnetic field and radiation. The evolution of protostellar condensations, from the moment they are assembled by turbulent flows to the time they reach stellar densities, spans an enormous range of scales, resulting in a major computational challenge for simulations. Since the previous Protostars and Planets conference, dramatic advances in the development of new numerical algorithmic techniques have been successfully implemented on large scale parallel supercomputers. Among such techniques, Adaptive Mesh Refinement and Smooth Particle Hydrodynamics have provided frameworks to simulate the process of low-mass star formation with a very large dynamic range. It is now feasible to explore the turbulent fragmentation of molecular clouds and the gravitational collapse of cores into stars self-consistently within the same calculation. The increased sophistication of these powerful methods comes with substantial caveats associated with the use of the techniques and the interpretation of the numerical results. In this review, we examine what has been accomplished in the field and present a critique of both numerical methods and scientific results.

NTIS

Astrophysics; Mass; Simulation; Star Formation

20070002871 Lawrence Livermore National Lab., Livermore, CA USA

Bent Marshak Waves

Hurricane, O. A.; Hammer, J. H.; Oct. 12, 2005; 26 pp.; In English

Report No.(s): DE2006-885356; UCRL-CONF-216103; No Copyright; Avail.: National Technical Information Service (NTIS)

Radiation driven heat waves (Marshak Waves) are ubiquitous in astrophysics and terrestrial laser driven high energy density plasma physics (HEDP) experiments. Generally, the equations describing Marshak waves are so nonlinear, that solutions involving more than one spatial dimension require simulation. However, in this paper we show how one may analytically solve the problem of the two-dimensional nonlinear evolution of a Marshak wave, bounded by lossy walls, using an asymptotic expansion in a parameter related to the wall albedo and a simplification of the heat front equation of motion. Three parameters determine the nonlinear evolution, a modified Marshak diffusion constant, a smallness parameter related to the wall albedo, and the spacing of the walls. The final nonlinear solution shows that the Marshak wave will be both slowed and bent by the non-ideal boundary. In the limit of a perfect boundary, the solution recovers the original diffusion-like solution of Marshak. The analytic solution will be compared to a limited set of simulation results and experimental data.

NTIS

Plasma Waves; Radiant Heating; Astrophysics

20070002902 NASA Marshall Space Flight Center, Huntsville, AL, USA

Canadian Led X-ray Polarimeter Mission CXP

Kaspi, V.; Hanna, D.; Weisskopf, M.; Ramsey, B.; Ragan, K.; Vachon, B.; Elsner, R.; Heyl, J.; Pavlov, G.; Cumming, A.; Sutton, M.; Rowlands, N.; [2006]; 1 pp.; In English; Canadian Space Astronomy Workshop: Creating Ideas for the Next Decade, 23-24 Nov. 2006, Saint Hubert, Quebec, Canada; Copyright; Avail.: Other Sources; Abstract Only

We propose a Canadian-led X-ray Polarimetry Mission (CXP), to include a scattering X-ray Polarimeter and sensitive All-Sky X-ray Monitor (ASXM). Polarimetry would provide a new observational window on black holes, neutron stars, accretion disks and jets, and the ASXM would offer sensitive monitoring of the volatile X-ray sky. The envisioned polarimeter consists of a hollow scattering beryllium cone surrounded by an annular proportional counter, in a simple and elegant design that is reliable and low-risk. It would be sensitive in the 6-30 keV band to approx. 3% polarization in approx. 30 Galactic sources and 2 AGN in a baseline 1-yr mission, and have sensitivity greater than 10 times that of the previous X-ray polarimeter flown (NASA's OSO-8, 1975-78) for most sources. This X-ray polarimeter would tackle questions like, Do black holes spin?, How do pulsars pulse?, What is the geometry of the magnetic field in accreting neutron stars? Where and how are jets produced in microquasars and AGN-, What are the geometries of many of the most famous accretion-disk systems in the sky? This will be done using a novel and until-now unexploited technique that will greatly broaden the available observational phase space of compact objects by adding to timing and spectroscopy observations of polarization fraction and position angle as a function of energy. The All-Sky X-ray Monitor would scan for transients, both as potential targets for the polarimeter but

also as a service to the worldwide astronomical community. The entire CXP mission could be flown for \$40- 60M CDN, according to estimates by ComDev International, and could be built entirely in Canada. It would fall well within the CSA's SmallSat envelope and would empower the growing and dynamic Canadian High-Energy Astrophysics community with world leadership in a potentially high impact niche area.

Author

Polarimeters; X Rays; Space Missions; Canadian Space Program; Astrophysics

20070002906 NASA Ames Research Center, Moffett Field, CA, USA

Stellar Properties of Embedded Protostars: Progress and Prospects

Greene, Thomas; [2006]; 2 pp.; In English; No Copyright; Avail.: Other Sources; Abstract Only

Until now, high extinctions have prevented direct observation of the central objects of self-embedded, accreting protostars. However, sensitive high dispersion spectrographs on large aperture telescopes have allowed us to begin studying the stellar astrophysical properties of dozens of embedded low mass protostars in the nearest regions of star formation. These high dispersion spectra allow, for the first time, direct measurements of their stellar effective temperatures, surface gravities, rotation velocities, radial velocities (and spectroscopic binarity), mass accretion properties, and mass outflow indicators. Comparisons of the stellar properties with evolutionary models also allow us to estimate masses and constrain ages. We find that these objects have masses similar to those of older, more evolved T Tauri stars, but protostars have higher mean rotation velocities and angular momenta. Most protostars indicate high mass accretion or outflow, but some in Taurus-Auriga appear to be relatively quiescent. These new results are testing, expanding, and refining the standard star formation paradigm, and we explore how to expand this work further.

Author

Protostars; Embedding; Stellar Temperature; Star Formation; T Tauri Stars; Astrophysics

91

LUNAR AND PLANETARY SCIENCE AND EXPLORATION

Includes planetology; selenology; meteorites; comets; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

20070002529 NASA Marshall Space Flight Center, Huntsville, AL, USA

Lunar e-Library: Putting Space History to Work

McMahan, Tracy A.; Shea, Charlotte A.; Finckenor, Miria; [2006]; 7 pp.; In English; Space 2006, 19-21 Sep. 2006, San Jose, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): NAS8-01050; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002529>; Avail.: CASI: A02, Hardcopy

As NASA plans and implements the Vision for Space Exploration, managers, engineers, and scientists need historically important information that is readily available and easily accessed. The Lunar e-Library - a searchable collection of 1100 electronic (.PDF) documents - makes it easy to find critical technical data and lessons learned and put space history knowledge in action. The Lunar e-Library, a DVD knowledge database, was developed by NASA to shorten research time and put knowledge at users' fingertips. Funded by NASA's Space Environments and Effects (SEE) Program headquartered at Marshall Space Flight Center (MSFC) and the MSFC Materials and Processes Laboratory, the goal of the Lunar e-Library effort was to identify key lessons learned from Apollo and other lunar programs and missions and to provide technical information from those programs in an easy-to-use format. The SEE Program began distributing the Lunar e-Library knowledge database in 2006. This paper describes the Lunar e-Library development process (including a description of the databases and resources used to acquire the documents) and the contents of the DVD product, demonstrates its usefulness with focused searches, and provides information on how to obtain this free resource.

Author

Lunar Programs; World Wide Web; Histories; Aerospace Environments

20070002637 NASA Marshall Space Flight Center, Huntsville, AL, USA

Comets, Asteroids, Meteorites, and the Origin of the Biosphere

Hoover, Richard B.; Proceedings of SPIE: Instruments, Methods, and Missions for Astrobiology IX Conference; [2006]; Volume 6309; 13 pp.; In English; Instruments, Methods, and Missions for Astrobiology IX, 14-15 Aug. 2006, San Diego, CA, USA

Report No.(s): SPIE Paper 6309-18; Copyright; Avail.: Other Sources

During the past few decades, the delivery of water, organics, and prebiotic chemicals to the Biosphere of Earth during the Hadean (4.5-3.8 Ga) period of heavy bombardment by comets and asteroids has become more widely accepted. Comets are still largely regarded as frigid, pristine bodies of protosolar nebula material that are devoid of liquid water and therefore unsuitable for life. Complex organic compounds have been observed in comets and on the water-rich asteroid 1998 KY26 and near IR observations have indicated the presence of crystalline water ice and ammonia hydrate on the large Kuiper Belt object (50000) Quaoar that has resurfacing suggesting cryovolcanic outgassing. Spacecraft observations of the chemical compositions and characteristics of the nuclei of several comets (Halley, Borrelly, Wild 2, and Tempel 1) have shown that comets contain complex organic chemicals; that water is the predominant volatile; and that extremely high temperatures (approx. 350-400 K) can be reached on the surface of the very black (albedo approx. 0.03) nuclei of comets when they approach the Sun. Impact craters and pinnacles observed on comet Wild 2 suggest a thick crust. Episodic outbursts and jets from the nuclei of several comets indicate that localized regimes of liquid water and water vapor can periodically exist beneath the comet crust. The Deep Impact mission found the temperature of the nucleus of comet Tempel 1 at 1.5 AU varied from a minimum of 280 plus or minus 8 K to the 330K (57 C) on the sunlit side. In this paper it is argued that that pools and films of liquid water exist (within a wide range of temperatures) in cavities and voids just beneath the hot, black crust. The possibility of liquid water existing over a wide range of temperatures significantly enhances the possibility that comets might contain niches suitable for the growth of microbial communities and ecosystems. These regimes would be ideal for the growth of psychrophilic, mesophilic, and thermophilic photoautotrophs and chemolithotrophs such as the motile filamentous cyanobacteria (e.g., Calothrix, Oscillatoria, Phormidium, and Spirulina) that grow in geothermal springs and geysers of Earth at temperatures ranging from 320K to 345K and are also found growing in cold polar desert soils. The mineralized remains of morphotypes of all of these cyanobacteria have also been found in the Orgueil CI1 and the Murchison CN2 carbonaceous meteorites that may derive from cometary parent bodies. Observational results that support the hypothesis that liquid water can in active regions just beneath the surface of comets and that comets, carbonaceous meteorites, and asteroids may have played a significant role in the origin and evolution of the Biosphere and in the distribution of microbial life throughout the Solar System.

Author

Asteroids; Biosphere; Comets; Carbonaceous Meteorites; Exobiology

20070002698 NASA Marshall Space Flight Center, Huntsville, AL, USA

Radiation Dose from Lunar Neutron Albedo

Adams, J. H., Jr.; Bhattacharya, M.; Lin, Zi-Wei; Pendleton, G.; [2006]; 1 pp.; In English; Geant 4/SPENNIS Workshop, 6-10 Nov. 2006, Pasadena, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

The lunar neutron albedo from thermal energies to 8 MeV was measured on the Lunar Prospector Mission in 1998-1999. Using GEANT4 we have calculated the neutron albedo due to cosmic ray bombardment of the moon and found a good-agreement with the measured fast neutron spectra. We then calculated the total effective dose from neutron albedo of all energies, and made comparisons with the effective dose contributions from both galactic cosmic rays and solar particle events to be expected on the lunar surface.

Author

Lunar Albedo; Neutron Spectra; Radiation Dosage; Aerospace Sciences

20070002701 NASA Marshall Space Flight Center, Huntsville, AL, USA

Processing of Space Resources to Enable the Vision for Space Exploration

Curreri, Peter A.; [2006]; 1 pp.; In English; International Conference on Solidification Science and Processing (ICSSP III), 20-23 Nov. 2006, Jaipur, India; No Copyright; Avail.: Other Sources; Abstract Only

The NASA human exploration program as directed by the Vision for Exploration (G.W. Bush, Jan. 14,2004) includes developing methods to process materials on the Moon and beyond to enable safe and affordable human exploration. Processing space resources was first popularized (O'Neill 1976) as a technically viable, economically feasible means to build city sized habitats and multi GWatt solar power satellites in Earth/Moon space. Although NASA studies found the concepts to be technically reasonable in the post Apollo era (AMES 1979), the front end costs the limits of national or corporate investment. In the last decade analysis of space on has shown it to be economically justifiable even on a relatively small mission or commercial scenario basis. The Mars Reference Mission analysis (JSC 1997) demonstrated that production of return propellant on Mars can enable an order of magnitude decrease in the costs of human Mars missions. Analysis (by M. Duke 2003) shows that production of propellant on the Moon for the Earth based satellite industries can be commercially viable after a human lunar base is established. Similar economic analysis (Rapp 2005) also shows large cost benefits for lunar propellant production for Mars missions and for the use of lunar materials for the production of photovoltaic power (Freundlich 2005).

Recent technologies could enable much smaller initial costs, to achieve mass, energy, and life support self sufficiency, than were achievable in the 1970s. If the Exploration Vision program is executed with a front end emphasis on space resources, it could provide a path for human self reliance beyond Earth orbit. This path can lead to an open, non-zero-sum, future for humanity with safer human competition with limitless growth potential. This paper discusses extension of the analysis for space resource utilization, to determine the minimum systems necessary for human self sufficiency and growth off Earth. Such an approach can provide a more compelling and comprehensive path to space resource utilization.

Author

Space Exploration; In Situ Resource Utilization; NASA Space Programs; Space Processing

20070002800 NASA Marshall Space Flight Center, Huntsville, AL, USA

Mercury Sample Return using Solar Sails

Montgomery, Edward E.; Young, Roy M.; Adams, Charles L.; [2006]; 1 pp.; In English; Division for Planetary Sciences Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: [C01](#), CD-ROM: [A01](#), Hardcopy

A conventional Mercury sample return mission requires significant launch mass due to the large Δv required for the outbound and return trips, and the large mass of a planetary lander and ascent vehicle. Solar sailing can be used to reduce lander mass allocation by delivering the lander to a low, thermally safe orbit close to the terminator. Propellant mass is not an issue for solar sails so a sample can be returned relatively easily, without resorting to lengthy, multiple gravity assists. The initial Mercury sample return studies reported here were conducted under ESA contract ESTEC/16534/02/NL/NR, PI Colin McInnes, Technical Officer Peter Falkner. Updated solar sail capabilities were developed under the Ground System Demonstration program, funded by the NASA's In-Space Propulsion Technology (ISPT) Program.

Author

Sample Return Missions; Solar Sails; Mercury (Planet); Space Missions

20070002812 NASA Marshall Space Flight Center, Huntsville, AL, USA

Experimental Evaluation of a Water Shield for a Surface Power Reactor

Pearson, J. Boise; Reid, Robert S.; [2006]; 2 pp.; In English; American Nuclear Society (ANS) Winter Meeting and Nuclear Technology Expo, 12-16 Nov. 2006, Albuquerque, NM, USA; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002812>; Avail.: CASI: [A01](#), Hardcopy

As part of the Vision for Space Exploration the end of the next decade will bring man back to the surface of the moon. One of the most critical issues for the establishment of human presence on the moon will be the availability of compact power sources. The establishment of man on the moon will require power from greater than 10's of kWt's in follow on years. Nuclear reactors are extremely well suited to meet the needs for power generation on the lunar or Martian surface reactor system. Several competing concepts exist for lightweight, safe, robust shielding systems such as a water shield, lithium hydride (LiH), Boron Carbide, and others. Water offers several potential advantages, including reduced cost, reduced technical risk, and reduced mass. Water has not typically been considered for space reactor applications because of the need for gravity to remove the potential for radiation streaming paths. The water shield concept relies on predictions of passive circulation of the shield water by natural convection to adequately cool the shield. This prediction needs to be experimentally evaluated, especially for shields with complex geometries. MSFC has developed the experience and fac necessary to do this evaluation in the Early Flight Fission - Test Facility (EFF-TF).

Derived from text

Power Reactors; Lunar Surface; Moon; Shielding

20070002901 NASA Marshall Space Flight Center, Huntsville, AL, USA

A One-Piece Lunar Regolith-Bag Garage Prototype

Smithers, Gweneth A.; Nehls, Mary K.; Hovater, Mary A.; Evans, Steven W.; Miller, J. Scott; Broughton, Roy M., Jr.; Beale, David; Killinc-Balci, Fatma; [2006]; 67 pp.; In English; Space Resources Roundtable VIII, 31 Oct. - 2 Nov. 2006, Golden, CO, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: [A04](#), Hardcopy

Shelter structures on the moon, even in early phases of exploration, should incorporate lunar materials as much as possible. We designed and constructed a prototype for a one-piece regolith-bag unpressurized garage concept, and, in parallel, we conducted a materials testing program to investigate six candidate fabrics to learn how they might perform in the lunar environment. In our concept, a lightweight fabric form is launched from Earth to be landed on the lunar surface and robotically filled with raw lunar regolith. In the materials testing program, regolith-bag fabric candidates included: VectranTM,

Nextel™, Gore PTFE Fabric™, Zylon™ Twaron™ and Nomex™. Tensile (including post radiation exposure), fold, abrasion, and hypervelocity impact testing were performed under ambient conditions, and, within our current means, we also performed these tests under cold and elevated temperatures. In some cases, lunar simulant (JSC-1) was used in conjunction with testing. Our ambition is to continuously refine our testing to reach lunar environmental conditions to the extent possible. A series of preliminary structures were constructed during design of the final prototype. Design is based on the principles of the classic masonry arch. The prototype was constructed of Kevlar™ and filled with vermiculite (fairly close to the weight of lunar regolith on the moon). The structure is free-standing, but has not yet been load tested. Our plan for the future would be to construct higher fidelity mockups with each iteration, and to conduct appropriate tests of the structure.

Author

Regolith; Lunar Surface; Lunar Soil; Prototypes; Fabrics; Composite Materials; Lunar Geology

20070002909 NASA Marshall Space Flight Center, Huntsville, AL, USA

Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon

Runyon, Cassandra; [2006]; 2 pp.; In English; Chandrayaan-1 Science Meeting, 6-7 Sep. 2006, Bangalore, India; Original contains black and white illustrations

Contract(s)/Grant(s): NNM05AB26C; Copyright; Avail.: CASI: [A01](#), Hardcopy

Moon Mineralogy Mapper (M3) is a state-of-the-art high spectral resolution imaging spectrometer that will characterize and map the mineral composition of the Moon. The M3 instrument will be flown on Chandrayaan-I, the Indian Space Research Organization (ISRO) mission to be launched in March 2008. The Moon is a cornerstone to understanding early solar system processes. M3 high-resolution compositional maps will dramatically improve our understanding about the early evolution of the terrestrial planets and will provide an assessment of lunar resources at high spatial resolution.

Derived from text

Imaging Spectrometers; Mineralogy; Moon; Composition (Property); Lunar Maps

20070003472 NASA Ames Research Center, Moffett Field, CA, USA

Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications

Cuzzi, J. N.; Hogan, R.; Dobrovolskis, A.; Paque, J.; [2006]; 1 pp.; In English

Contract(s)/Grant(s): RTOP 334-37-22-03; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070003472>; Avail.: CASI: [A01](#), Hardcopy

It is generally agreed that individual chondrules formed as entities in a gaseous nebula prior to being accumulated into a meteorite parent body, within which they incur various forms of modification before arriving in our labs. While there are major unanswered questions about the properties of the nebula environment in which chondrules formed, the process by which the most primitive meteorites are formed overwhelmingly from chondrules must then be an aspect of 'nebula processing'. Textures in certain fragments of primitive meteorites might be summarized as being primarily chondrules and clastic, chondrule-sized, fragments of other minerals, each covered with a rim of fine dust with physical and chemical properties which are essentially independent of the composition and mineralogy of the underlying chondrule. This (unfortunately rather rare) texture was called 'primary accretionary texture' to reflect their belief that it precedes subsequent stages in which fragmentation, comminution, mixing, heating, and other forms of alteration occur on the parent body(-ies). The size distribution of these chondrules and fragments, and the properties of their dusty rims, are key clues regarding the primary nebula accretion process. Even in the much more abundant meteorites which have clearly suffered internal mixing, abrasion, grinding, and even mineralogical alteration or replacement (due presumably to the collisional growth and heating process itself), key chondrule properties such as mean size and density remain relatively well defined, and well defined rims persist in many cases. It has been our goal to infer the key nebula processes indirectly from the properties of these very earliest primitive meteorites by making use of a theoretical framework in which the nebula possesses a plausible level of isotropic turbulence. We have shown that turbulence has the property of concentrating one particular particle size by orders of magnitude, where the preferentially concentrated size depends primarily on the intensity of the turbulent kinetic energy (represented by the Reynolds number of the nebula). Specifically, the preferentially concentrated particle is that which has a stopping time equal to the turnover time of the smallest eddy. The intensity level of turbulence implied by chondrule sizes can be maintained by even a small fraction of the energy released by the radially evolving disk (it must be noted that the details of how this transfer of energy actually occurs remain obscure, however).

Derived from text

Chondrule; Meteorites; Meteoritic Composition; Nebulae; Reynolds Number; Turbulence; Meteoritic Microstructures

92
SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots. For related information see 93 *Space Radiation*.

20070002808 NASA Marshall Space Flight Center, Huntsville, AL, USA

The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project

Suess, Steven T.; Poletto, Giannina; [2006]; 1 pp.; In English; Ulysses Science Working Team Meeting, 5-10 Nov. 2006, Oxnard, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Current sheets (CSs) are a prerequisite for magnetic reconnection. An International Space Science Institute (ISSI, of Bern, Switzerland) research team will work to empirically define current sheet properties in the solar atmosphere and their signatures in the interplanetary medium, and to understand their role in the development of solar eruptive events. The project was inspired by recently acquired ground and space based observations that reveal CS signatures at the time of flares and Coronal Mass Ejections (CMEs), in the chromosphere, in the corona and in the interplanetary medium. At the same time, theoretical studies predict the formation of CSs in different models and configurations, but theories and observational results have not yet developed an interaction efficient enough to allow us to construct a unified scenario. The team will generate synergy between observers, data analysts, and theoreticians, so as to enable a significant advance in understanding of current sheet behavior and properties. A further motivation for studying CSs is related to the expected electric fields in CSs that may be the source of solar energetic particles (SEPs). The team has 14 members from Europe and the US. The first meeting is in October 2006 and the second is late in 2007.

Author

Current Sheets; Solar Physics; Aerospace Sciences; International Cooperation

20070002820 NASA Marshall Space Flight Center, Huntsville, AL, USA

Requirements and Techniques for Developing and Measuring Simulant Materials

Rickman, Doug; Owens, Charles; Howard, Rick; [2006]; 2 pp.; In English; Space Resources Roundtable VIII, 31 Oct. - 2 Nov. 2006, Golden, CO, USA

Contract(s)/Grant(s): NCC8-200; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002820>; Avail.: CASI: A01, Hardcopy

The 1989 workshop report entitled Workshop on Production and Uses of Simulated Lunar Materials and the Lunar Regolith Simulant Materials: Recommendations for Standardization, Production, and Usage, NASA Technical Publication identify and reinforced a need for a set of standards and requirements for the production and usage of the lunar simulant materials. As NASA need prepares to return to the moon, a set of requirements have been developed for simulant materials and methods to produce and measure those simulants have been defined. Addressed in the requirements document are: 1) a method for evaluating the quality of any simulant of a regolith, 2) the minimum Characteristics for simulants of lunar regolith, and 3) a method to produce lunar regolith simulants needed for NASA's exploration mission. A method to evaluate new and current simulants has also been rigorously defined through the mathematics of Figures of Merit (FoM), a concept new to simulant development. A single FoM is conceptually an algorithm defining a single characteristic of a simulant and provides a clear comparison of that characteristic for both the simulant and a reference material. Included as an intrinsic part of the algorithm is a minimum acceptable performance for the characteristic of interest. The algorithms for the FoM for Standard Lunar Regolith Simulants are also explicitly keyed to a recommended method to make lunar simulants.

Derived from text

Simulation; Lunar Rocks; Algorithms; Lunar Geology

93
SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see 51 *Life Sciences*; on human beings see 52 *Aerospace Medicine*. For theory see 73 *Nuclear Physics*.

20070002805 NASA Marshall Space Flight Center, Huntsville, AL, USA

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions

Khazanov, G. V.; Gamayunov, K. V.; Gallagher, D. L.; Kozyra, J. U.; Liemohn, M. W.; [2006]; 1 pp.; In English; Huntsville 2006 Workshop, 2-6 Oct. 2006, Nashville, TN, USA; No Copyright; Avail.: Other Sources; Abstract Only

The self-consistent treatment of the RC ion dynamics and EMIC waves, which are thought to exert important influences on the ion dynamical evolution, is an important missing element in our understanding of the storm-and recovery-time ring current evolution. Under certain conditions, relativistic electrons, with energies greater than or equal to 1 MeV, can be removed from the outer radiation belt by EMIC wave scattering during a magnetic storm (Summers and Thorne, 2003; Albert, 2003). That is why the modeling of EMIC waves is critical and timely issue in magnetospheric physics. This study will generalize the self-consistent theoretical description of RC ions and EMIC waves that has been developed by Khazanov et al. [2002, 2003] and include the heavy ions and propagation effects of EMIC waves in the global dynamic of self-consistent RC - EMIC waves coupling. The results of our newly developed model that will be presented at Huntsville 2006 meeting, focusing mainly on the dynamic of EMIC waves and comparison of these results with the previous global RC modeling studies devoted to EMIC waves formation. We also discuss RC ion precipitations and wave induced thermal electron fluxes into the ionosphere.

Author

Ring Currents; Heavy Ions; High Energy Electrons; Ion Cyclotron Radiation; Electromagnetic Radiation; Wave Scattering

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.

20070002942 NASA Dryden Flight Research Center, Edwards, CA, USA

2005 Engineering Annual Report

Stoliker, Patrick; Bowers, Albion; Cruciani, Everlyn; December 2006; 48 pp.; In English; See also 20070002943 - 20070002958; Original contains color and black and white illustrations

Report No.(s): NASA/TM-2006-213687; H-2670; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002942>;

Avail.: CASI: [A03](#), Hardcopy

Selected research and technology activities at Dryden Flight Research Center are summarized. These activities exemplify the Center's varied and productive research efforts.

Author

Aerodynamics; Flight Control; Propulsion; Dynamic Structural Analysis

20070002943 NASA Dryden Flight Research Center, Edwards, CA, USA

Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls

Maliska, Heather A.; 2005 Engineering Annual Report; December 2006, pp. 13-14; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002943>; Avail.: CASI: [A01](#), Hardcopy

The F-15 Intelligent Flight Control Systems (IFCS) Gen-2 project objective includes flight test of a dynamic inversion controller augmented by a direct adaptive neural network to demonstrate performance improvements in the presence of simulated failure/damage. The Gen-2 objectives as implemented on the NASA NF-15B (McDonnell Douglas Corporation, St. Louis, Missouri) airplane created challenges for structural loading limitations. A loads clearance approach including a Structural Loads Model Validation (SLMV) flight phase was developed to ensure flight safety.

Author

F-15 Aircraft; Flight Control; Loads (Forces); Flight Tests

20070002947 NASA Dryden Flight Research Center, Edwards, CA, USA

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S)

Ginn, Starr; 2005 Engineering Annual Report; December 2006, pp. 10-13; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002947>; Avail.: CASI:

[A01](#), Hardcopy

A new 60 000-lb capacity Starr Soft Support (60K3S) has been in the making for 3 years and is finally in use. This innovative design can be used for weight and balance measurements, complete inertia tensor measurements, ground vibration tests (GVT), control surface free-play tests and Structural Mode Interaction (SMI) tests using a single basic setup. The 60K3S allows aircraft to be tested in a free-free environment to simulate in-flight boundary conditions. The 60K3S also eliminates

the need for engineers to spend weeks trying to model boundary conditions of aircraft sitting on the ground with the nonlinearities of strut and tire stiffness.

Author

Control Surfaces; Structural Engineering; Supports; Lift Devices; Structural Weight

20070002952 NASA Dryden Flight Research Center, Edwards, CA, USA

Controlling a 757-200 Airplane with Throttles Only

Cole, Jennifer H.; 2005 Engineering Annual Report; December 2006, pp. 6; In English; See also 20070002942; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002952>; Avail.: CASI: **A01**, Hardcopy

In mid-2005, the Department of Homeland Security (DHS) sponsored an initiative to extend throttles-only control (TOC) techniques to current commercial fleet aircraft. This initiative involves both United Airlines (UAL) and the NASA Dryden Flight Research Center (DFRC). It concentrates on the development of piloting techniques for alternate operation of an aircraft, should it become disabled in flight. Named Propulsion-Controlled Aircraft Recovery (PCAR), this project utilizes UAL assets, such as pilots, simulators and aircraft, and NASA engineers to conduct research on the use of TOC as an alternative method of aircraft control. Control using throttles only involves utilizing the thrust generated by the engines to control the aircraft in all three axes of flight, and can be used to supplement or replace degraded flight controls.

Author

Throttling; Boeing 757 Aircraft; Commercial Aircraft; Aircraft Control

20070002953 NASA Dryden Flight Research Center, Edwards, CA, USA

Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface

Herrera, Claudia; 2005 Engineering Annual Report; December 2006, pp. 15-17; In English; See also 20070002942; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002953>; Avail.: CASI: **A01**, Hardcopy

The correlation effort for the QuietSpike (Gulfstream Aerospace, Savannah, Georgia) (QS) boom Finite Element Model (FEM) was devised to follow the QS build-up ground vibration testing (GVT) approach. A non-traditional testing and model correlation method had to be implemented because of flight-test article availability and intense project schedule. A mock-up version of the QuietSpike boom was designed and fabricated with similar modal characteristics as those of the QS flight article. An FEM of this mock QS was then generated and updated with the appropriate GVT data. This facilitated the mating of the actual QS FEM, once correlated to GVT, to the F-15B FEM.

Author

Fabrication; Stiffness; F-15 Aircraft; Models; Structural Vibration

20070002954 NASA Dryden Flight Research Center, Edwards, CA, USA

QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach

Spivey, Natalie; 2005 Engineering Annual Report; December 2006, pp. 18-20; In English; See also 20070002942; Original contains black and white illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002954>; Avail.: CASI:

A01, Hardcopy

The F-15B (McDonnell Douglas, St. Louis, Missouri) airplane, tail number 836 was selected to fly Gulfstream Aerospace Corporation's (GAC) (Savannah, Georgia) QuietSpike (QS) project; however, this experiment is very unique and unlike any of the previous testbed experiments. It involves the addition of a relatively long quiet spike boom attached to the radar bulkhead of the airplane. This QS experiment is a stepping stone to airframe structural morphing technologies designed to mitigate the sonic boom strength of business jets over land. Prior to flying the QuietSpike boom on the F-15B airplane, several ground vibration tests (GVT) were required in order to understand the QS modal characteristics and coupling effects with the airplane. Because of the project's intense schedule, a 'traditional' GVT of the mated F-15B QuietSpike ready-for-flight configuration would not have left sufficient time available for the finite element model update and flutter analyses before flight test.

Author

Vibration Tests; F-15 Aircraft; Ground Tests; Structural Engineering; Fabrication

20070002955 NASA Dryden Flight Research Center, Edwards, CA, USA

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles

Kostyk, Christopher; 2005 Engineering Annual Report; December 2006, pp. 1-3; In English; See also 20070002942; Original contains color illustrations; No Copyright; ONLINE: <http://hdl.handle.net/2060/20070002955>; Avail.: CASI: A01, Hardcopy

The thermal protection system (TPS) of a space vehicle is a very critical system, as the tragic Space Shuttle Columbia accident highlighted. Currently there is no system to monitor the health of a TPS. The instrumentation in use on flight vehicles today consists of traditional sensor systems: thermocouples, strain gages, pressure transducers, and a few others. This current technology in sensor systems is all far too heavy to consider for use in a full-field health monitoring system. Fiber optic sensors (specifically fiber Bragg Grating (FBG) sensors) are extremely lightweight, however, and have the capability of multiplexing many sensors onto one fiber, therefore minimizing system weight and complexity.

Author

Systems Health Monitoring; Thermal Protection; Aerospace Vehicles; Crew Exploration Vehicle

Subject Term Index

A STARS

Gemini's ALTAIR Adaptive Optics System – 249

ABERRATION

From Classical Adaptive Optics to MCAO – 252

ABLATION

Ablation Loss Studies for Capillary - Sustained Plasmas – 228

ACCELERATION (PHYSICS)

Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209

ACCELERATORS

Analysis of Availability and Reliability in RHIC Operations – 209

ACCIDENT INVESTIGATION

Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27

NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23

ACCIDENTS

Final Report for the Joint Urban 2003 Atmospheric Dispersion Study in Oklahoma City: Lawrence Livermore National Laboratory Participation – 105

ACCUMULATORS

Global Energy and Aviation Concerns – 6

ACETALS

Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55

ACIDITY

Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 57

ACIDS

Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43

ACOUSTIC MEASUREMENT

A Flexible Cymbal Array – 86

ACOUSTIC PROPERTIES

Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles – 16

ACOUSTICS

Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80

Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles – 15

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

MFXRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79

ACOUSTO-OPTICS

Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

ACQUISITION

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244

ACRYLATES

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

ACRYLIC RESINS

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

ACTINIDE SERIES

Phase Stability in Heavy f-Electron Metals from First-Principles Theory – 51

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

ACTIVATION

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

ACTIVE CONTROL

Active Control of Blade Tonals in Underwater Vehicles – 214

Advanced Thermal HPT Clearance Control – 15

Hokupa'a: Gemini's First AO System – 249

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15

ACTUATORS

Actuator Trade-Off Analysis for DARPA/BOSS Prototype II – 83

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 95

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87

ADA (PROGRAMMING LANGUAGE)

Using SPARK-Ada to Model and Verify a MILS Message Router – 155

ADAPTATION

A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146

An Interim Report of Research on Stochastic and Adaptive Systems – 191

Increasing Replayability with Deliberative and Reactive Planning – 156

ADAPTIVE CONTROL

Active Control of Blade Tonals in Underwater Vehicles – 214

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

MFXRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61

ADAPTIVE FILTERS

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 80

ADAPTIVE OPTICS

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

Adaptive Optics: A Core Gemini Program – 251

AO Imaging of Quasar Host Galaxies – 252

FLAMINGOS-2: A New MOS on the Block – 255

From Classical Adaptive Optics to MCAO – 251

Gemini South Adaptive Optics Imager – 251

Gemini South Science Highlights – 254

Gemini's Adaptive Optics Program: An Overview – 250

Gemini's ALTAIR Adaptive Optics System – 249

Gemini's Laser Guide Star Facility – 248

Ground Layer AO (GLAO): A 'Third Gemini' – 254

History of U.S. Adaptive Optics Funding – 254
Hokupa'a: Gemini's First AO System – 249
MCAO at Gemini – 250
NIFS at Gemini North – 255
Science from NIFS System Verification – 252
Searching for Planets with NICI – 253
The Gemini Planet Imager – 255
Very Low-mass Binaries – 253

ADDITIVES

Thermoelectric Power Factor for Electrically Conductive Polymers – 57
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38

ADENOVIRUSES

Novel Therapeutic Approach for Breast Cancer – 135

ADSORPTION

Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230

ADVANCED VERY HIGH RESOLUTION RADIOMETER

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 99

AEROACOUSTICS

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 88
Phase Calibration of Microphones by Measurement in the Free-field – 211

AEROBES

Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64

AEROCAPTURE

Aerocapture Benefits to Future Science Missions – 247

AERODYNAMIC DRAG

Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 92

AERODYNAMIC FORCES

Aerocapture Benefits to Future Science Missions – 247

Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3

AERODYNAMIC HEATING

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

AERODYNAMIC LOADS

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

AERODYNAMICS

2005 Engineering Annual Report – 267
Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3

AEROELASTIC RESEARCH WINGS

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17
Hilbert-Huang Transform-Based Stability Spectral Analysis – 10
Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

AEROELASTICITY

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17
Multi-Input Multi-Output Flight Data Analysis with HHT – 16

AERONAUTICS

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 2, April 2006 – 2
Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 4, August 2006 – 1
Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 5, October 2006 – 1

AEROSERVOELASTICITY

Multi-Input Multi-Output Flight Data Analysis with HHT – 16

AEROSOLS

Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – 108
Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTs? – 109

AEROSPACE ENGINEERING

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 170
In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59
NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23
Overview of NASA Glenn Seal Project – 29

AEROSPACE ENVIRONMENTS

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24
Lunar e-Library: Putting Space History to Work – 262
Optical Coatings and Surfaces in Space: MISSE – 217
Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28

AEROSPACE SCIENCES

Radiation Dose from Lunar Neutron Albedo – 263
The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266

AEROSPACE SYSTEMS

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17
Configurable Aerospace Command and Control (CACC) – 65
Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16
Recent Advances in Solar Sail Propulsion at NASA – 33
The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11
Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58

AEROSPACE VEHICLES

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 269

AEROTHERMODYNAMICS

Aerocapture Benefits to Future Science Missions – 247
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

AFRICA

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138
Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians – 118

AGE FACTOR

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

AGGREGATES

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing – 141

AIR LAUNCHING

The Crossbow Air Launch Trade Space – 5

AIR NAVIGATION

Flight Display Integration – 17

AIR POLLUTION

Arizona Department of Environmental Quality, Title V Operating Permit Program Evaluation – 108

Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire – 106

Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses – 109

Maricopa County Environmental Services Department, Title V Operating Permit Program Evaluation – 107

Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44

Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 109

Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – 108

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 104

AIR QUALITY

Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 100

Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – 108

AIR SEA ICE INTERACTIONS

Ocean Tide Models Performance in Coastal Regions – 116

AIR TRAFFIC CONTROLLERS (PERSONNEL)

Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 6

AIR TRAFFIC CONTROL

Guidance of Nonlinear Systems – 18

Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 5

Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7

AIR TRAFFIC

Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7

AIR TRANSPORTATION

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

AIR WATER INTERACTIONS

Ocean Tide Models Performance in Coastal Regions – 116

AIRCRAFT CARRIERS

The Crossbow Air Launch Trade Space – 5

AIRCRAFT CONTROL

Controlling a 757-200 Airplane with Throttles Only – 268

AIRCRAFT DESIGN

Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 92

The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11

AIRCRAFT ENGINES

Advanced Thermal HPT Clearance Control – 15

High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29

Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14

AIRCRAFT STRUCTURES

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

AIRCRAFT

Air Force Organizational Adoption of Remotely Piloted Vehicles – 11

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10

AIRFOILS

Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3

AIRLINE OPERATIONS

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

AIRPORTS

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

ALBEDO

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

ALGEBRA

The Logical Foundations of Evidential Reasoning (revised) – 184

ALGORITHMS

A Randomized Algorithm for the Approximation of Matrices – 180

A Sublinear Algorithm of Sparse Fourier Transform for Nonequispaced Data – 200

Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17

An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 60

COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188

Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186

Dynamics of a Loop-Free Path-Finding Algorithm – 163

Efficient Symbol-Spreading Strategies for Wireless Communication – 70

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

Guidance of Nonlinear Systems – 18

High-Speed Fiber Bragg Grating Interrogation System Development – 158

HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80

Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments – 184

Iterated Local Optimization for Minimum Energy Broadcast – 185

Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – 194

Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216

MFRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 259

Multiple Walkers in the Wang-Landau Algorithm – 150

- Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data – [187](#)
- Notes on Averaging Over Acyclic Digraphs and Discrete Coverage Control – [200](#)
- Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – [151](#)
- Parallelization of a Blind Deconvolution Algorithm (Postprint) – [184](#)
- Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – [212](#)
- Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – [79](#)
- Regulating a Formation of a Large Number of Vehicles – [173](#)
- Requirements and Techniques for Developing and Measuring Simulant Materials – [266](#)
- Routing in Packet-Switched Networks Using Path-Finding Algorithms – [188](#)
- Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – [74](#)
- Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – [174](#)
- Shaped-Based Recognition of 3D Objects From 2D Projections – [175](#)
- Super-Resolution Algorithms for Nondestructive Evaluation Imaging – [204](#)
- ALKENES**
- Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – [41](#)
- ALLOCATIONS**
- Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – [181](#)
- ALLOYING**
- Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – [47](#)
- ALLOYS**
- Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – [47](#)
- ALUMINUM ALLOYS**
- Alloy Design of Nanoscale Precipitation Strengthened Alloys: Design of a Heat Treatable Aluminum Alloy Useful to 400 Degrees Celsius. Final Report – [52](#)
- Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – [50](#)
- ALUMINUM OXIDES**
- Preparation of Nanocomposites of Alumina and Titania – [54](#)
- ALUMINUM**
- Certain Aluminum Plate from South Africa. Investigation No. 731-TA-1056 (Final) – [52](#)
- Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – [63](#)
- AMBIENT TEMPERATURE**
- Elastomeric Seal Development for Advanced Docking/Berthing System – [26](#)
- AMMUNITION**
- Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – [186](#)
- AMORPHOUS MATERIALS**
- Fluorescence Approaches to Growing Macromolecule Crystals – [35](#)
- AMPLIFICATION**
- Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – [78](#)
- AMPLIFIERS**
- Sense Amplifier for Static Random Access Memories – [73](#)
- AMPLITUDE MODULATION**
- Differential Space-Time Modulation for Wideband Wireless Networks – [168](#)
- ANALYSIS (MATHEMATICS)**
- Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – [91](#)
- ANGIOGENESIS**
- Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – [132](#)
- ANGLE OF ATTACK**
- Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – [91](#)
- ANIMALS**
- Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – [127](#)
- ANNUAL VARIATIONS**
- Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – [260](#)
- ANOMALIES**
- Distinguishing Novel Usage From Novel Attacks – [160](#)
- Learning-Based Anomaly Detection in BGP Updates – [159](#)
- ANTENNA RADIATION PATTERNS**
- Low-Profile Radiators in Non-Periodic Wideband Arrays – [83](#)
- ANTENNAS**
- Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – [79](#)
- Low-Profile Radiators in Non-Periodic Wideband Arrays – [83](#)
- Safety Core Insulator Failures Reliability Analysis – [79](#)
- ANTIBODIES**
- Process Research and Development of Antibodies as Countermeasures for C. Botulinum – [133](#)
- ANTIGENS**
- Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – [138](#)
- The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – [126](#)
- Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – [116](#)
- ANTIREFLECTION COATINGS**
- Optical Coatings and Surfaces in Space: MISSE – [218](#)
- ANXIETY**
- Amygdala, Anxiety and Alpha(1) Adrenoceptors: Investigations Utilizing a Rodent Model of Traumatic Stress – [125](#)
- APERTURES**
- Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – [79](#)
- Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – [223](#)
- APPLICATIONS OF MATHEMATICS**
- Screen Processing for Satellite Laser Ranging at High Repetition Rate – [257](#)
- APPROXIMATION**
- A Randomized Algorithm for the Approximation of Matrices – [180](#)
- Numerical Approximations for Non-Zero-Sum Stochastic Differential Games – [179](#)
- Numerical Approximations for Stochastic Systems With Delays in the State and Control – [180](#)
- AQUIFERS**
- Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems – [100](#)
- ARCHITECTURE (COMPUTERS)**
- Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – [84](#)
- The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – [237](#)
- ARCTIC OCEAN**
- Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – [114](#)

ARES 1 LAUNCH VEHICLE

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22

NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process – 20

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22

ARES 1 UPPER STAGE

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22

ARES 5 CARGO LAUNCH VEHICLE

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20

ARKANSAS

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101

ARMED FORCES (UNITED STATES)

Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240

Reducing C-17 Pilot Training Delays – 6

ARMOR

Special Workshop: Kolsky/Split Hopkinson Pressure Bar Testing of Ceramics – 58

ARRAYS

A Flexible Cymbal Array – 86

ARTIFICIAL INTELLIGENCE

A Deduction Model of Belief and Its Logics – 172

Belief and Incompleteness – 196

Branching Storylines in Virtual Reality Environments for Leadership Development – 155

Cognitive Network Computer for Atmospheric Monitoring – 115

Hierarchic Autoepistemic Theories for Nonmonotonic Reasoning: Preliminary Report – 168

On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT – 176

Parallel Randomized State-Space Search – 174

Shakey the Robot – 171

The Role of Logic in Knowledge Representation and Commonsense Reasoning – 198

ARTIFICIAL SATELLITES

Multiple Usage of Existing Satellite Sensors (PREPRINT) – 23

Multiple Usage of Existing Satellite Sensors – 23

The New SLR Ephemeris and its Application to Predicting Satellites – 258

ASHES

Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – 105

ASSEMBLING

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing – 141

ASTEROIDS

Comets, Asteroids, Meteorites, and the Origin of the Biosphere – 263

ASTHMA

Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – 108

ASTRONICS

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

ASTRONAUTICS

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 2, April 2006 – 2

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 4, August 2006 – 1

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 5, October 2006 – 1

ASTRONOMICAL OBSERVATORIES

Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 257

Luminosity Function and Segregation Effect of the Open Cluster NGC 6530 – 259

Satellite Laser Ranging Observations at the Shanghai Astronomical Observatory in 2005 – 260

The Scientific Research and Technical Work of Shanghai Astronomical Observatory in 2005 – 257

ASTRONOMY

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258

Studying High-z Galaxies with MCAO – 254

The GLAST Burst Monitor – 248

Very Low-mass Binaries – 253

ASTROPHYSICS

Bent Marshak Waves – 261

Canadian Led X-ray Polarimeter Mission CXP – 261

Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261

GRMHD Simulations of Jet Formation with RAISHIN – 260

NIFS at Gemini North – 255

Stellar Properties of Embedded Protostars: Progress and Prospects – 262

ASYMMETRY

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 212

ASYMPTOTIC SERIES

Refined Large Deviation Asymptotics for the Classical Occupancy Problem – 182

ASYNCHRONOUS TRANSFER MODE

Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219

ATMOSPHERIC BOUNDARY LAYER

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

ATMOSPHERIC CHEMISTRY

Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 112

ATMOSPHERIC CIRCULATION

Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111

ATMOSPHERIC COMPOSITION

Advanced 2-micron Solid-state Laser for Wind and CO₂ Lidar Applications – 94

ATMOSPHERIC DENSITY

Another Analytical Approach to Predicting Munition Trajectories – 111

ATMOSPHERIC EFFECTS

Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113

ATMOSPHERIC ENTRY

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

ATMOSPHERIC MODELS

Aerocapture Benefits to Future Science Missions – [247](#)

ATMOSPHERIC TURBULENCE

Gemini's ALTAIR Adaptive Optics System – [249](#)

ATOMIC BEAMS

Neutral Atom Lithography With Multi-Frequency Laser Fields – [47](#)

ATOMIC CLOCKS

Chip-Scale Atomic Clock (CSAC) and Method for Making Same – [203](#)

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – [258](#)

ATOMIC ENERGY LEVELS

Status of Fast IR Orbit Feedback at RHIC – [207](#)

ATOMS

Application of Density Functional Theory to Systems Containing Metal Atoms – [50](#)

MBE Deposition of Epitaxial Fe_{1-x}V_x Films for Low-Loss GHz Devices; Atomic-Scale Engineering of Magnetic Dynamics – [83](#)

ATTACKING (ASSAULTING)

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – [146](#)

ATTENUATORS

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – [134](#)

AUGMENTATION

Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – [9](#)

Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – [94](#)

AUTOMATIC PILOTS

C-20A Precision Autopilot Development – [10](#)

AUTOMOBILE FUELS

Hybrid Drive Partnerships Keep the Army on the Right Road – [60](#)

AUTONOMY

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – [170](#)

AUXILIARY POWER SOURCES

Dual Mode Power Unit Having a Combustor Bypass System – [14](#)

AVIONICS

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – [13](#)

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – [32](#)

BACILLUS

Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – [108](#)

BARIUM

Barium Carbonate from China. Investigation No. 731-TA-1020 (Final) – [35](#)

Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – [89](#)

BAROTROPISM

Ocean Tide Models Performance in Coastal Regions – [116](#)

BAYES THEOREM

Bayesian Multidimensional Scaling and Choice of Dimension – [178](#)

Hierarchical Bayesian Approach to Locating Seismic Events – [190](#)

BEAM CURRENTS

Development of BPM Electronics at the JLAB FEL – [232](#)

BEAMFORMING

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – [140](#)

BEAMS (SUPPORTS)

Mast Wake Reduction by Shaping – [90](#)

BENEFICIATION

Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – [105](#)

BIMETALS

Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – [25](#)

BINARY STARS

Science from NIFS System Verification – [252](#)

BINDING ENERGY

Application of Density Functional Theory to Systems Containing Metal Atoms – [50](#)

BIOCHEMISTRY

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – [142](#)

BIODEGRADABILITY

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – [137](#)

BIOENGINEERING

Structural Analysis and Bioengineering of Thermostable Pyrococcus Furiosus Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification – [48](#)

BIOGEOCHEMISTRY

The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – [117](#)

BIOGRAPHY

Militant Ideology Atlas: Research Compendium – [234](#)

BIOLOGICAL EFFECTS

Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – [123](#)

BIOLOGICAL WEAPONS

Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – [108](#)

Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – [108](#)

BIOMAGNETISM

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – [119](#)

BIOMIMETICS

Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – [84](#)

BIOREACTORS

Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – [117](#)

BIOSPHERE

Comets, Asteroids, Meteorites, and the Origin of the Biosphere – [263](#)

BIOSYNTHESIS

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – [129](#)

BIRDS

Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sterna Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005 – [244](#)

BLACK HOLES (ASTRONOMY)

AO Imaging of Quasar Host Galaxies – [253](#)

GRMHD Simulations of Jet Formation with RAISHIN – [260](#)

IRS-8 : A Galactic Black Sheep – [252](#)

BLADE TIPS

Microwave Blade Tip Clearance System: An Update – [34](#)

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – [15](#)

BLADE-VORTEX INTERACTION

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – [4](#)

BLOOD VESSELS

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – [139](#)

BLOOD

Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – [129](#)

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – [119](#)

BODIES OF REVOLUTION

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66

BODY TEMPERATURE

Thermoregulatory Control Following Dynamic Exercise – 138

BODY WEIGHT

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119

Quasi-Pro prospective Study of Breast Cancer and Diet – 137

BODY-WING CONFIGURATIONS

Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 92

BOEING 747 AIRCRAFT

Global Energy and Aviation Concerns – 6

BOEING 757 AIRCRAFT

Controlling a 757-200 Airplane with Throttles Only – 268

BOILERS

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 105

BONDING

Metallic Seal Development for Advanced Docking/Berthing System – 52

BONE MINERAL CONTENT

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

BOOMS (EQUIPMENT)

Boom Rendezvous Alternative Docking Approach – 31

BOUNDARIES

Direct and Inverse Scattering for Beltrami Fields – 189

Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200

Reduced Navier-Stokes Equations Near a Flow Boundary – 88

BOUNDARY CONDITIONS

Computational Simulation of Semispan Wings in Wind Tunnels – 2

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74

Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113

BOUNDARY LAYER TRANSITION

Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate – 90

BOUNDARY LAYERS

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111

BOUNDARY VALUE PROBLEMS

Direct and Inverse Scattering for Beltrami Fields – 189

BRAGG GRATINGS

High-Speed Fiber Bragg Grating Interrogation System Development – 158

OCDM Transmission Experiments on JGNII Test bed Optical Link – 219

BRAIN

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – 124

BRAZIL

Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review) – 51

BREAST

A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134

Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells – 139

An Evaluation of Stereoscopic Digital Mammography for Earlier Detection of Breast Cancer and Reduced Rate of Recall – 126

Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer – 136

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – 139

Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126

EGFR Activation by Spatially Restricted Ligands – 131

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – 132

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 128

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 136

Novel Therapeutic Approach for Breast Cancer – 134

Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129

Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137

Quality of Breast Cancer Care: The Role of Hispanic Ethnicity, Language, and Socioeconomic Position – 131

Quasi-Pro prospective Study of Breast Cancer and Diet – 137

Refining Functional Optical Imaging of the Breast with Quantum Dots – 129

The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141

The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells – 128

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

Undergraduate Training in Mammary Gland Biology and Breast Cancer – 133

BRIDGES (LANDFORMS)

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110

BRIDGES (STRUCTURES)

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97

BROADBAND

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 224

Differential Space-Time Modulation for Wideband Wireless Networks – 168

- Experiments of a Terabit-Class Super-Network – 220
- Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- R&D Activities of Photonic Networks in the World – 221
- Supercontinuum Generation and its Applications – 77
- BROADCASTING**
- Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166
- COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188
- Iterated Local Optimization for Minimum Energy Broadcast – 185
- BRONCHI**
- Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 117
- BROWN DWARF STARS**
- Very Low-mass Binaries – 253
- BRUSH SEALS**
- Advanced Seal Rig Experiments and Analysis – 25
- Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25
- Rotating Intershaft Brush Seal Project – 26
- BUBBLES**
- Domain Walls, Near-BPS Bubbles and Probabilitites in the Landscape – 226
- BUDGETS**
- The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 21
- BULGING**
- M31 Star Formation Histories – 249
- C BAND**
- Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- C-135 AIRCRAFT**
- Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3
- CADMIUM**
- Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- CALIBRATING**
- A Comparison of Two Balance Calibration Model Building Methods – 189
- Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9
- Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44
- Militant Ideology Atlas: Executive Report – 234
- Phase Calibration of Microphones by Measurement in the Free-field – 211
- Software Realization Method of Extracting VLBI Phase Calibration Signal – 259
- Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18
- The Analysis and Test of Phase Calibration – 260
- CALIFORNIA**
- Power of Partnership – 147
- CAMERAS**
- Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- CANADIAN SPACE PROGRAM**
- Canadian Led X-ray Polarimeter Mission CXP – 262
- CANCELLATION**
- Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8
- Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79
- CANCER**
- A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134
- A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – 130
- Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells – 139
- An Evaluation of Stereoscopic Digital Mammography for Earlier Detection of Breast Cancer and Reduced Rate of Recall – 126
- Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132
- Caveolin-1 Modulates Androgen Receptor Signaling in Advanced Prostate Cancer – 131
- Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer – 136
- Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126
- EGFR Activation by Spatially Restricted Ligands – 131
- Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135
- Endogenous 6-Hydroxylmelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140
- Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – 132
- Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
- Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135
- Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138
- Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 128
- Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129
- Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 136
- Novel Therapeutic Approach for Breast Cancer – 134
- Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129
- Patient Race and Outcome Preferences as Predictors of Urologists Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer – 127
- Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137
- Prostate Cancer Detection by Molecular Urinalysis – 136
- Quality of Breast Cancer Care: The Role of Hispanic Ethnicity, Language, and Socioeconomic Position – 131
- Quasi-Prospective Study of Breast Cancer and Diet – 137
- Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134
- Refining Functional Optical Imaging of the Breast with Quantum Dots – 129
- Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer – 132
- The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141
- The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

- The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells – [128](#)
- Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – [139](#)
- Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – [127](#)
- Undergraduate Training in Mammary Gland Biology and Breast Cancer – [133](#)
- CANTILEVER PLATES**
Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – [62](#)
- CAPTURE EFFECT**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – [203](#)
- CARBON DIOXIDE**
Overview of NASA's Propulsion 21 Effort – [25](#)
- CARBON MONOXIDE**
Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – [47](#)
- CARBON NANOTUBES**
NanoElectronics and BioElectronics – [75](#)
- CARBON STEELS**
Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – [52](#)
Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review) – [51](#)
- CARBONACEOUS METEORITES**
Comets, Asteroids, Meteorites, and the Origin of the Biosphere – [263](#)
- CARBONATES**
Barium Carbonate from China. Investigation No. 731-TA-1020 (Final) – [35](#)
- CARBON**
Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – [52](#)
High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – [29](#)
NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006 – [106](#)
- CARDIOVASCULAR SYSTEM**
Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – [123](#)
Molecular Basis of Essential Thrombocytosis – [133](#)
- Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – [139](#)
- CATALYSIS**
Development of a Rapid Decontamination System for the Nerve Agents – [49](#)
- CATHODES**
Compact, Portable Pulsed-Power – [201](#)
Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – [202](#)
- CAVITIES**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – [40](#)
- CELLS (BIOLOGY)**
Cellular Gate Technology – [116](#)
Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – [124](#)
- CELLULOSE**
Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – [64](#)
Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final) – [37](#)
- CEMENTS**
Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – [55](#)
- CEPHEID VARIABLES**
Cepheids in Multiple Systems: ADS 14859 – [256](#)
- CERAMIC MATRIX COMPOSITES**
MRS Workshop Explores the Diversity of 3D Multifunctional Ceramic Composites – [47](#)
- CERAMICS**
Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – [55](#)
Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – [56](#)
MRS Workshop Explores the Diversity of 3D Multifunctional Ceramic Composites – [47](#)
Special Workshop: Kolsky/Split Hopkinson Pressure Bar Testing of Ceramics – [58](#)
Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – [13](#)
- CESIUM**
Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – [44](#)
- CHANNEL FLOW**
Channel Sharing of Competing Flows in Ad Hoc Networks – [165](#)
- CHANNELS (DATA TRANSMISSION)**
Secure Communication with Quantum Cryptography – [76](#)
- CHAOS**
An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – [199](#)
Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – [183](#)
- CHARACTER RECOGNITION**
Parsing and Tagging of Bilingual Dictionary – [243](#)
- CHARACTERIZATION**
Generation and Characterization of Attosecond Pulses – [208](#)
Supercontinuum Generation and its Applications – [77](#)
- CHARGE CARRIERS**
Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – [230](#)
Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – [216](#)
- CHARGED PARTICLES**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – [54](#)
- CHARM (PARTICLE PHYSICS)**
Open and Hidden Charm Production at RHIC and LHC – [202](#)
- CHARTS**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – [36](#)
- CHEMICAL REACTIONS**
Cellular Gate Technology – [116](#)
Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – [48](#)
- CHEMICAL REACTORS**
Design Rules for High Temperature Microchemical Systems – [48](#)
- CHEMICAL WARFARE**
New Tools for Measurement of Personal Exposure to Chemical Environments – [46](#)
- CHEMOTHERAPY**
Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – [137](#)
Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – [139](#)

CHILDREN

Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66

Online Victimization: A Report on the Nation's Youth – 147

The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – 126

CHINA

Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 257

Artists' Canvas from China. Investigation No. 731-TA-1091 (Final) – 38

Barium Carbonate from China. Investigation No. 731-TA-1020 (Final) – 35

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary) – 37

Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – 52

China Spallation Neutron Source Accelerators: Design, Research, and Development – 207

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary) – 49

CHIPS (ELECTRONICS)

Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203

CHONDRULE

Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265

CHROMATIN

Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells – 122

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

CHROMOSOMES

An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design – 148

CIRCUIT BOARDS

Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78

CIRCUITS

Boost Logic: A High Speed Energy Recovery Circuit Family – 81

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258

Secure Communication with Quantum Cryptography – 76

CIRRUS CLOUDS

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

CITIES

Final Report for the Joint Urban 2003 Atmospheric Dispersion Study in Oklahoma City: Lawrence Livermore National Laboratory Participation – 105

CLASSICAL MECHANICS

Quantum Network Consisting of Laser-cooled Ions and Photons – 77

CLASSIFICATIONS

A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers – 63

Classification Management Tutorial – 240

Graph-Based Methods for Orbit Classification – 148

Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212

Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242

Using SPARK-Ada to Model and Verify a MILS Message Router – 155

CLASSIFIERS

A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers – 63

Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170

CLAYS

Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37

CLEANING

Effect of Solventless Bore Cleaning Device (SBGD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40

CLEARANCES

Microwave Blade Tip Clearance System: An Update – 34

CLIMATE CHANGE

Our Changing Planet: The U.S. Climate Change Science Program for Fiscal Year 2007. A Supplement to the President's Budget for Fiscal Year 2007 – 113

CLIMATE

Ocean Tide Models Performance in Coastal Regions – 116

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

CLIMATOLOGY

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

CLOCKS

Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9

CLOSTRIDIUM BOTULINUM

Process Research and Development of Antibodies as Countermeasures for C. Botulinum – 133

CLUSTER ANALYSIS

Cross-Document Coreference on a Large Scale Corpus – 190

CLUTTER

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – 140

Shaped-Based Recognition of 3D Objects From 2D Projections – 175

CMOS

Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor – 72

COAL UTILIZATION

Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – 105

COAL

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 105

COARSENESS

Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99

COASTAL PLAINS

Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems – 100

COATINGS

Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration – 36

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

COAXIAL CABLES

Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72

COCKPITS

Flight Display Integration – 17

CODE DIVISION MULTIPLE ACCESS

Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219

CODE DIVISION MULTIPLEXING

OCDM Transmission Experiments on JGNII Test bed Optical Link – 219

CODING

Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156

MUC-4 Test Results and Analysis – 238

COGNITION

An Image Schema Language – 172

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

Cognitive Network Computer for Atmospheric Monitoring – 115

COHERENT LIGHT

Absorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230

COHERENT RADIATION

Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219

COLD WEATHER

Prevention of Cold Injuries During Exercise – 142

COLLECTION

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48

Managing Information Collection and Dissemination, Fiscal Year 2002 – 236

COLLIMATORS

Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 225

COLLISION AVOIDANCE

A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Channel Sharing of Competing Flows in Ad Hoc Networks – 165

Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163

Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165

Directional Collision Avoidance in Ad Hoc Networks – 85

Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165

Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166

COLLISIONS

RHIC Operational Status and Upgrade Plans – 210

COLLOIDS

Process for the Production of Emulsions and Dispersions – 44

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103

COLORIMETRY

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing – 141

COLOR

Certain Colored Synthetic Organic Oleoresinous Pigment Dispersions from India. Investigation Nos. 701-TA-436 (Preliminary) and 731-TA-1042 (Preliminary) – 53

Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212

Three-Dimensional Display Assembly – 86

COLUMBIA (ORBITER)

Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27

COMBAT

Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medical Recommendations – 145

Increasing Replayability with Deliberative and Reactive Planning – 156

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146

Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3

COMBINATORIAL ANALYSIS

Incremental Interpretation – 236

COMBUSTION CHAMBERS

Dual Mode Power Unit Having a Combustor Bypass System – 14

COMBUSTION CHEMISTRY

Turbulent Chemical Interaction Models in NCC: Comparison – 88

COMBUSTION PRODUCTS

Advanced Thermal HPT Clearance Control – 15

COMBUSTION

Design Rules for High Temperature Microchemical Systems – 48

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 104

COMETS

Comets, Asteroids, Meteorites, and the Origin of the Biosphere – 263

COMMAND AND CONTROL

A Typology for C2 Measures – 68

Configurable Aerospace Command and Control (CAC) – 65

COMMERCE

Mapping of Technological Opportunities-Labyrinth Seal Example – 26

COMMERCIAL AIRCRAFT

Controlling a 757-200 Airplane with Throttles Only – 268

The Crossbow Air Launch Trade Space – 5

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

COMMERCIALIZATION

Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation – 103

In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59

Technology Transition a Model for Infusion and Commercialization – 143

COMMUNICATION NETWORKS

A General Probabilistic Model for Improving Key Assignment in Wireless Networks – 68

An Examination of Remote Access Help Desk Cases – 160

Differential Space-Time Modulation for Wideband Wireless Networks – 168

Distributed Assignment of Codes in Multihop Radio Networks – 71

Ideas on Multi-layer Dialogue Management for Multi-party, Multi-conversation, Multi-modal Communication (Extended Abstract of Invited Talk), – 69

Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70

Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218

Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77

Policy-Aware Connectionless Routing – 166

Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68

Routing in Packet-Switched Networks Using Path-Finding Algorithms – 188

Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – 192

Wireline ITS Communications Training: Year 1 Report of Activities – 65

COMMUNICATION SATELLITES
Impact of Solar Array Designs on High Voltage Operations – 30

COMMUNICATION
Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80

COMPETITION
Telecommunications: FCC Needs to Improve Its Ability to Monitor and Determine the Extent of Competition in Dedicated Access Services – 66

COMPLEX SYSTEMS
A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146
Modeling Complex Nonlinear Optical Systems – 225

COMPOSITE MATERIALS
A One-Piece Lunar Regolith-Bag Garage Prototype – 265
Composite, Nanostructured, Super-Hydrophobic Material – 41
Composite, Ordered Material Having Sharp Surface Features – 41
Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42
Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41

COMPOSITE STRUCTURES
Composites Damage Tolerance Workshop – 42

COMPOSITION (PROPERTY)
Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265

COMPRESSORS
Microwave Blade Tip Clearance System: An Update – 34

COMPUTATIONAL CHEMISTRY
Computational Prediction of Kinetic Rate Constants – 47

COMPUTATIONAL FLUID DYNAMICS
Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate – 90
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
Final Report for the Joint Urban 2003 Atmospheric Dispersion Study in Oklahoma City: Lawrence Livermore National Laboratory Participation – 105

COMPUTATION
Computational Nanoelectronics and Nanotechnology at NASA ARC – 86

COMPUTER AIDED DESIGN
Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 129

COMPUTER INFORMATION SECURITY
Architecture-Based Refinements for Secure Computer Systems Design – 164
Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries – 161
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
Privacy-Preserving Distributed Information Sharing – 241
Quantum Network Consisting of Laser-cooled Ions and Photons – 77

COMPUTER NETWORKS
A Model of Onion Routing With Provable Anonymity – 167
A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164
A Study for Technology of Controlling Next-Generation Backbone Network – 219
Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries – 161
Cognitive Network Computer for Atmospheric Monitoring – 115
Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163
Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165
Dynamics of a Loop-Free Path-Finding Algorithm – 163
Experiments of a Terabit-Class Super-Network – 220
Information Technology: DOD Needs to Ensure that Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers – 150
Information Technology: DOD Needs to Ensure That Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers – 159
Iterated Local Optimization for Minimum Energy Broadcast – 185
Methods and Systems for Autonomously Managing a Network – 149
Monitoring Environmental Boundaries with a Robotic Sensor Network – 185
Online Victimization of Youth: Five Years Later – 147
Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165
Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162
Token Ring Protocol for Dynamic Ad-hoc Wireless Environments – 148

COMPUTER PROGRAMMING
A Common Knowledge Representation for Plan Generation and Reactive Execution – 152
Advanced Tool Integration for Embedded System Assurances – 157
Carving Differential Unit Test Cases from System Test Cases – 154
Reasoning About Programs – 153
WTEC Panel Report on High-End Computing Research and Development in Japan – 150

COMPUTER PROGRAMS
Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188
Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
Reasoning About Programs – 153
Software Realization Method of Extracting VLBI Phase Calibration Signal – 259
Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29

COMPUTER STORAGE DEVICES
Shape Memory Polymer Therapeutic Devices for Stroke – 55

COMPUTER SYSTEMS DESIGN
A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157
Architecture-Based Refinements for Secure Computer Systems Design – 164

COMPUTER SYSTEMS PERFORMANCE
Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – 168
NERSC Sustained System Performance (SSP) Metric – 147

COMPUTER SYSTEMS PROGRAMS
Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7
Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158

COMPUTER TECHNIQUES
Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126
Improving the Communication of Geographic Patterns of Disease through Computer-Based Tools – 146
Information Security: Agencies Need to Develop and Implement Adequate Policies for Periodic Testing – 151

COMPUTER VISION

Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 156

Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170

COMPUTERIZED SIMULATION

An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 61

Branching Storylines in Virtual Reality Environments for Leadership Development – 155

Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44

Computational Simulation of Semispan Wings in Wind Tunnels – 2

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38

Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56

Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – 3

Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175

Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3

User Evaluation of Biospice – 141

COMPUTERS

Cognitive Network Computer for Atmospheric Monitoring – 115

NERSC Sustained System Performance (SSP) Metric – 147

Pervasive Computing (PvC) ... and Its Impact on Next Generation Army Systems – 157

CONFERENCES

2006 Gordon Research Conference on Molecular and Ionic Cluster. Final Progress Report – 201

Overview of the Third Message Understanding Evaluation and Conference – 152

CONJUGATES

MCAO at Gemini – 251

CONJUGATION

Gemini's ALTAIR Adaptive Optics System – 249

CONNECTORS

Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198

The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245

CONSERVATION LAWS

An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181

Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182

Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151

Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199

CONSERVATION

Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199

CONSTANTS

Computational Prediction of Kinetic Rate Constants – 47

CONSTELLATIONS

Advanced Docking Berthing System Update – 28

CONSTRUCTION

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244

Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183

RHIC Operational Status and Upgrade Plans – 210

CONTAINMENT

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

CONTAMINANTS

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – 108

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 104

CONTAMINATION

Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40

Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

CONTINENTAL SHELVES

Ocean Tide Models Performance in Coastal Regions – 116

CONTINUOUS RADIATION

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

CONTROL BOARDS

Support Platform and Communications to Manage Cooperative AUV Operations – 69

CONTROL SURFACES

Fiber Optic Sensor Attachment Development and Performance Evaluations – 224

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 267

CONTROL SYSTEMS DESIGN

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

CONTROL THEORY

Experimental Implementation of a Non-linear Control Method for Magnetostrictive Transducers – 96

Regulating a Formation of a Large Number of Vehicles – 173

CONTROLLERS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63

MFRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61

Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213

Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – 148

CONTROL

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146

CONVECTION

Rotation Prevents Finite-Time Breakdown – 178

CONVERGENCE

Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182

Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Convergence Analysis – 197

CONVERSATION

Conversation as Planned Behavior – 170

Ideas on Multi-layer Dialogue Management for Multi-party, Multi-conversation, Multi-modal Communication (Extended Abstract of Invited Talk), – 69

CONVERTERS

Summary of Stirling Converter Testing at NASA Glenn Research Center – 88

CONVEYORS

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48

CONVULSIONS

Sulfonamide Cannabinoid Agonists and Antagonists – 37

COOLING

Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209

COORDINATES

Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 258

COORDINATION

Group Coordination Support in Networked Multimedia Systems – 167

Multisites Coordination in Shared Multicast Trees – 164

CORONAGRAPHS

Science from NIFS System Verification – 252

Searching for Planets with NICI – 253

The Gemini Planet Imager – 255

COSMOLOGY

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226

COST ANALYSIS

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10

COST EFFECTIVENESS

Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses – 109

Parallel Randomized State-Space Search – 174

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10

COST REDUCTION

Parallel Randomized State-Space Search – 174

COSTS

History of U.S. Adaptive Optics Funding – 254

Multiple Walkers in the Wang-Landau Algorithm – 150

COUNTERMEASURES

Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140

Process Research and Development of Antibodies as Countermeasures for C. Botulinum – 133

COUPLED MODES

Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79

COVERALLS

Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143

CRACK PROPAGATION

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10

CRAMER-RAO BOUNDS

Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Postprint) – 173

CREW EXPLORATION VEHICLE

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 13

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 269

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91

CRIME

Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66

CRITERIA

The Nyquist Stability Criterion for a Class of Spatially Periodic Systems – 178

CRYOGENIC FLUID STORAGE

In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59

CRYOGENIC ROCKET PROPELLANTS

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59

CRYOGENICS

Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59

Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207

CRYPTOGRAPHY

A Model of Onion Routing With Provable Anonymity – 167

Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174

CRYSTALLIZATION

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38

Fluorescence Approaches to Growing Macromolecule Crystals – 35

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228

CRYSTALS

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

Photonic Band Gap Devices for Commercial Applications – 232

Photonic Crystal Light Emitting Diodes – 95

CUES

Flare Cue Symbolology for Zero-Zero Weather Landings – 5

CULTURE MEDIA

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94

CURRENT SHEETS

The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266

CURVATURE

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223

CYCLES

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 212

CYCLOHEXANE

Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39

CYCLOTRON RADIATION

Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229

CYLINDRICAL BODIES

General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208

CYSTEINE

Cysteine Variants of Erythropoietin – 204

DAMAGE ASSESSMENT

Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 30

DAMAGE

Composites Damage Tolerance Workshop – 42

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42

DATA ACQUISITION

A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants – 160

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242

SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100

Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sterna Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005 – 244

User Evaluation of Biospice – 141

DATA BASES

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

Java Implementation of a Single-Database Computationally Symmetric Private Information Retrieval (cSPIR) Protocol – 240

Mapping WorldNet Senses to a Lexical Database of Verbs – 237

Proposal for a High Energy Nuclear Database – 209

DATA FLOW ANALYSIS

Research and Development of High-Capacity Optical Link Technologies – 218

DATA LINKS

Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7

DATA MANAGEMENT

DyNetML: Interchange Format for Rich Social Network Data – 246

DATA MINING

Structure Discovery in Sequentially Connected Data – 241

DATA PROCESSING EQUIPMENT

GPS Radio Occultation Data Processing System – 258

High-Speed Fiber Bragg Grating Interrogation System Development – 158

DATA PROCESSING

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17

Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – 168

Incremental Interpretation – 236

Lightweight Structure in Text – 154

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152

MUC-4 Test Results and Analysis – 238

Multi-Input Multi-Output Flight Data Analysis with HHT – 16

Structure Discovery in Sequentially Connected Data – 241

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237

Utterance and Objective: Issues in Natural Language Communication – 171

Volumetric Data Analysis Using Morse-Smale Complexes – 149

DATA SIMULATION

Graphical Representation of Temporal Data from Simulations – 150

DATA TRANSMISSION

Advanced Lightpath Establishment for Distributed Computing – 221

Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72

Method to Estimate Noise in Data – 195

DECISION SUPPORT SYSTEMS

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242

DECODERS

Status of Development of Photon Number Resolving Detectors – 76

DECODING

Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174

DECOMPOSITION

The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 12

DECONTAMINATION

Development of a Rapid Decontamination System for the Nerve Agents – 49

DEFECTS

Mapping of Technological Opportunities-Labyrinth Seal Example – 26

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222

DEFORMABLE MIRRORS

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

DEFORMATION

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188

Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56

Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 257

DELAY

Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – 148

DELIVERY

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

DEMULTIPLEXING

EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission – 221

DEOXYRIBONUCLEIC ACID

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142

Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy – 137

Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer – 132

DEPOSITION

MBE Deposition of Epitaxial Fe1-xVx Films for Low-Loss Ghz Devices; Atomic-Scale Engineering of Magnetic Dynamics – 83

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103

DESIGN ANALYSIS

Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3

Developing of Design Criteria for Highly Efficient Fuel Cells – 104

High Performance Computing in Accelerating Structure Design and Analysis – 229

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20

Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22

DESIGN OPTIMIZATION

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

DESORPTION

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06 – 227

DETECTION

An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 61

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122

Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186

Design of Optical Matched Filters – 92

Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170

Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72

Learning-Based Anomaly Detection in BGP Updates – 159

Monitoring the News: A TDT Demonstration System – 234

New Tools for Measurement of Personal Exposure to Chemical Environments – 46

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

Prostate Cancer Detection by Molecular Urinalysis – 136

Real-time Motion Tracking from a Mobile Robot – 185

Remote Sensing of Alpha and Beta Sources Modeling Summary – 43

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light-Up Colorimetric Sensing – 140

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146

The Gemini Planet Imager – 255

DETECTORS

HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80

Monitoring Environmental Boundaries with a Robotic Sensor Network – 185

Multiple Usage of Existing Satellite Sensors (PREPRINT) – 23

Multiple Usage of Existing Satellite Sensors – 23

Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162

SeRLoc: Robust Localization for Wireless Sensor Networks – 162

DIAGNOSIS

Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126

Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

DIAMAGNETISM

Interpretation of Diamagnetic Signals – 206

DIAMONDS

Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230

DICTIONARIES

Parsing and Tagging of Bilingual Dictionary – 243

DIELECTRICS

Compact, Portable Pulsed-Power – 201

DIETS

Quasi-Prospective Study of Breast Cancer and Diet – 137

DIFFERENCE EQUATIONS

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

DIFFERENTIAL ABSORPTION LIDAR

Advanced 2-micron Solid-state Laser for Wind and CO₂ Lidar Applications – 94

DIFFERENTIAL EQUATIONS

An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – 199

Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

Three-Dimensional Finite-Volume EL-LAM Implementation – 184

DIFFERENTIAL GAMES

Numerical Approximations for Non-Zero-Sum Stochastic Differential Games – 179

DIFFERENTIAL GEOMETRY

An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181

Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182

Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199

DIFFRACTION

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222

DIFFUSIVITY

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

DIGITAL COMPUTERS

A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants – 160

DIGITAL FILTERS

Research on the Sampling Offset about Satellite Navigation Receiver – 258

DIODES

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

DIRECT NUMERICAL SIMULATION

Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate – 90

Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – 3

DIRECTIONAL ANTENNAS

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165

Directional Collision Avoidance in Ad Hoc Networks – 85

Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166

DISCRETE FUNCTIONS

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 80

DISEASES

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138

Improving the Communication of Geographic Patterns of Disease through Computer-Based Tools – 146

The Molecular Basis of Canavan Disease: Aspartoacylase Enzyme Characteristics – 124

DISKS

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

DISPERSING

Identification of the Compounds Formed During the Low Temperature Heat Dispersal of o-Chlorobenzylidene Malononitrile (CS Riot Control Agent) – 46

DISPERSION

Polarization-mode Dispersion and its Mitigation – 220

DISPLAY DEVICES

Display Research at the University of Southern California – 82

Flight Display Integration – 17

Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems – 92

Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146

Three-Dimensional Display Assembly – 86

DISTANCE

Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257

DIURNAL VARIATIONS

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 260

DOCKING

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

Advanced Docking Berthing System Update – 28

Elastomeric Seal Development for Advanced Docking/Berthing System – 26

DOMAIN WALL

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226

DOMAINS

A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151

Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149

DOORS

Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27

Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158

DOPED CRYSTALS

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

DOPPLER EFFECT

Imaging Performance of the Si/Ge Hybrid Compton Imager – 222

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74

DOPPLER RADAR

Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94

Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113

DOSIMETERS

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

DOWN-CONVERTERS

Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67

DRAG

Another Analytical Approach to Predicting Munition Trajectories – 111

DRILLING

Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72

DRONE VEHICLES

Ultra High Work, High Efficiency Turbines For UAVs – 12

DROSOPHILA

EGFR Activation by Spatially Restricted Ligands – 131

Signaling Pathways Controlling the Growth and Proliferation of Drosophila Perineurial Glial Cells – 122

DRUGS

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 137

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

DURABILITY

Advanced Seal Rig Experiments and Analysis – 25

DUST

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

DWARF STARS

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

DYNAMIC LOADS

Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation – 41

DYNAMIC MODELS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

DYNAMIC PRESSURE

Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208

DYNAMIC RANGE

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

DYNAMIC RESPONSE

Dynamics of a Loop-Free Path-Finding Algorithm – 163

DYNAMIC STRUCTURAL ANALYSIS

2005 Engineering Annual Report – 267

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97

DYNAMICAL SYSTEMS

Guidance of Nonlinear Systems – 18

EARTH ATMOSPHERE

GPS Radio Occultation Data Processing System – 258

EARTH ORBITAL ENVIRONMENTS

MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54

EARTH SCIENCES

Mirror Technology Roadmap – 216

EARTHQUAKES

Hierarchical Bayesian Approach to Locating Seismic Events – 190

Student Research Accomplishments, 2004-2005 – 97

ECOLOGY

SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100

ECOSYSTEMS

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 99

EDITING

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237

EDUCATIONAL RESOURCES

Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – 153

EDUCATION

Branching Storylines in Virtual Reality Environments for Leadership Development – 155

Evaluation of Multi-Party Reality Dialogue Interaction – 155

Student Research Accomplishments, 2004-2005 – 97

The Scientific Research and Technical Work of Shanghai Astronomical Observatory in 2005 – 257

Undergraduate Training in Mammary Gland Biology and Breast Cancer – 133

EFFICIENCY

Microwave Blade Tip Clearance System: An Update – 34

EIGENVECTORS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

EIKONAL EQUATION

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 189

ELASTIC DEFORMATION

Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications – 4

ELASTIC PROPERTIES

Advanced Seal Rig Experiments and Analysis – 25

Brush Seals for Improved Steam Turbine Performance – 24

Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanoscale Synthesis – 42

High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29

Numerical Simulations and an Experimental Investigation of a Finger Seal – 28

ELASTOMERS

Elastomeric Seal Development for Advanced Docking/Berthing System – 26

Metallic Seal Development for Advanced Docking/Berthing System – 52

ELECTRIC BATTERIES

Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103

ELECTRIC CONNECTORS

Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72

ELECTRIC FIELDS

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77

Reversible Nanoparticle Electronics – 210

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74

ELECTRIC POTENTIAL

A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223

ELECTRICAL RESISTIVITY

Thermoelectric Power Factor for Electrically Conductive Polymers – 57

ELECTROCHEMICAL SYNTHESIS

Electrosynthesis of Nanofibers and Nano-Composite Films – 36

ELECTROMAGNETIC ABSORPTION

AO Imaging of Quasar Host Galaxies – 253

ELECTROMAGNETIC PULSES

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74

ELECTROMAGNETIC RADIATION

Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266

ELECTROMAGNETISM

Electromagnetically Induced Transparency in Semiconductors – 84

ELECTROMECHANICS

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

ELECTRON BEAMS

Development of BPM Electronics at the JLAB FEL – 232

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202

System and Method for Producing Trahertz Radiation – 201

ELECTRON CLOUDS

Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208

Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230

New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227

Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06 – 227

ELECTRON DENSITY (CONCENTRATION)

Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229

Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225

ELECTRON ENERGY

Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225

ELECTRON GUNS

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202

ELECTRON IMPACT

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142

ELECTRONIC CONTROL

Studies on Architecture and Control Technology for Optical Packet Switches – 218

ELECTRONIC EQUIPMENT

Pervasive Computing (PVC) ... and Its Impact on Next Generation Army Systems – 157

ELECTRONICS

Computational Nanoelectronics and Nanotechnology at NASA ARC – 86

WTEC Panel Report on Spin Electronics – 75

ELECTRONS

Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230

High Energy Electron Transport in Solids – 206

ELECTRO-OPTICS

Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84

- High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – [115](#)
- Novel Photonic Devices Based on Electro-optic Modulation Technologies – [78](#)
- Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – [77](#)
- Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – [75](#)
- ELECTROPOLISHING**
- Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – [216](#)
- ELECTROSTATICS**
- New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – [227](#)
- ELLIPTICAL CYLINDERS**
- Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – [62](#)
- EMBEDDING**
- Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – [244](#)
- Stellar Properties of Embedded Protoplasts: Progress and Prospects – [262](#)
- EMITTANCE**
- Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – [45](#)
- EMOTIONAL FACTORS**
- Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – [120](#)
- EMULSIONS**
- Process for the Production of Emulsions and Dispersions – [44](#)
- ENERGY DISSIPATION**
- Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – [31](#)
- ENERGY GAPS (SOLID STATE)**
- Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – [82](#)
- Photonic Band Gap Devices for Commercial Applications – [232](#)
- ENERGY STORAGE**
- Field Studies of Exercise and Food Deprivation – [143](#)
- ENERGY TRANSFER**
- High Energy Electron Transport in Solids – [206](#)
- ENGINE DESIGN**
- Outboard Engines from Japan. Investigation No. 731-TA-1069 (Final) – [34](#)
- Overview of NASA Glenn Seal Project – [29](#)
- Rotating Intershaft Brush Seal Project – [26](#)
- ENGINEERING MANAGEMENT**
- Systems Integration Processes for NASA Ares I Crew Launch Vehicle – [23](#)
- ENGINEERING**
- Monitoring Completed Navigation Projects, Lessons Learned IV – [115](#)
- ENGINES**
- Outboard Engines from Japan. Investigation No. 731-TA-1069 (Preliminary) – [32](#)
- ENGLISH LANGUAGE**
- Mapping WorldNet Senses to a Lexical Database of Verbs – [237](#)
- MUC-4 Test Results and Analysis – [238](#)
- Overview of the Third Message Understanding Evaluation and Conference – [152](#)
- ENHANCED VISION**
- Flight Display Integration – [17](#)
- ENRICHMENT**
- Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – [119](#)
- ENTHALPY**
- Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – [91](#)
- ENTROPY**
- Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – [183](#)
- ENVIRONMENT EFFECTS**
- Overview of Space Environment Effects on Materials and GRC's Test Capabilities – [28](#)
- Recent Advances in Solar Sail Propulsion at NASA – [33](#)
- ENVIRONMENT MANAGEMENT**
- Maricopa County Environmental Services Department, Title V Operating Permit Program Evaluation – [107](#)
- ENVIRONMENT MODELS**
- Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – [100](#)
- ENVIRONMENT PROTECTION**
- Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – [45](#)
- ENVIRONMENT SIMULATORS**
- Toward the Holodeck: Integrating Graphics, Sound, Character and Story – [175](#)
- ENVIRONMENTAL MONITORING**
- Cognitive Network Computer for Atmospheric Monitoring – [115](#)
- ENVIRONMENTAL QUALITY**
- Arizona Department of Environmental Quality, Title V Operating Permit Program Evaluation – [108](#)
- Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – [108](#)
- ENVIRONMENTAL SURVEYS**
- NIOSH Health Hazard Evaluation Report: HETA No. 2004-0005-3024, Grove Park Inn Resort and Spa, Asheville, North Carolina, November 2006 – [107](#)
- NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006 – [106](#)
- ENVIRONMENTS**
- Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – [119](#)
- ENZYMES**
- Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – [130](#)
- Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer – [132](#)
- The Molecular Basis of Canavan Disease: Aspartoacylase Enzyme Characteristics – [124](#)
- EPHEMERIDES**
- The New SLR Ephemeris and its Application to Predicting Satellites – [259](#)
- EPIDEMIOLOGY**
- The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – [126](#)
- EPITAXY**
- Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanoscale Synthesis – [42](#)
- MBE Deposition of Epitaxial Fe_{1-x}V_x Films for Low-Loss GHz Devices; Atomic-Scale Engineering of Magnetic Dynamics – [83](#)
- EPOXY RESINS**
- An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – [94](#)
- EQUATIONS OF MOTION**
- Another Analytical Approach to Predicting Munition Trajectories – [111](#)
- EROSION**
- First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes – [49](#)
- MISSE PEACE Polymers Atomic Oxygen Erosion Results – [54](#)
- ERROR ANALYSIS**
- Multiscale Smoothing Error Models – [194](#)

ERROR SIGNALS

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258

ERRORS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186

Identifying Error in AUV Communication – 70

The Error Is the Clue: Breakdown In Human-Machine Interaction – 163

ESSENTIALLY NON-OSCILLATORY SCHEMES

An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

ESTIMATES

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

Method to Estimate Noise in Data – 195

ESTIMATING

Integration with Respect to Operator-Valued Measures with Applications to Quantum Estimation Theory – 233

Multiple Walkers in the Wang-Landau Algorithm – 150

Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PRE-PRINT) – 173

Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 5

ESTROGENS

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

ETHYL COMPOUNDS

Results from the Swedish National Screening 2005. Subreport 2. Biocides – 45

ETHYLENE COMPOUNDS

Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly – 36

EUROPE

WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 39

EVALUATION

User Evaluation of Biospice – 141

EXCITATION

FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93

EXCRETION

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

EXHAUST EMISSION

Advanced Thermal HPT Clearance Control – 15

Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire – 106

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 109

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15

EXHAUST GASES

Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire – 106

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15

EXO BIOLOGY

Comets, Asteroids, Meteorites, and the Origin of the Biosphere – 263

EXPERIMENT DESIGN

Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18

EXPONENTIAL FUNCTIONS

On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – 179

EXPOSURE

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94

New Tools for Measurement of Personal Exposure to Chemical Environments – 46

Optical Coatings and Surfaces in Space: MISSE – 217

EXTRACTION

Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 40

Software Realization Method of Extracting VLBI Phase Calibration Signal – 259

The Web as a Parallel Corpus – 243

EXTRASOLAR PLANETS

Searching for Planets with NICI – 253

The Gemini Planet Imager – 255

F-15 AIRCRAFT

Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – 268

Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls – 267

QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10

FABRICATION

Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – 268

Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Fiber Optic Sensor Attachment Development and Performance Evaluations – 224

High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27

Impact of Solar Array Designs on High Voltage Operations – 30

Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19

Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74

Mirror Technology Roadmap – 216

Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51

Phase Calibration of Microphones by Measurement in the Free-field – 211

Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78

QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58

FABRICS

A One-Piece Lunar Regolith-Bag Garage Prototype – 265

Artists' Canvas from China. Investigation No. 731-TA-1091 (Final) – 38

FAILURE

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42

Safety Core Insulator Failures Reliability Analysis – 79

FAST FOURIER TRANSFORMATIONS

A Sublinear Algorithm of Sparse Fourier Transform for Nonequispaced Data – 201

FAULT TOLERANCE

A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157

FEEDBACK CONTROL

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122

Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – 148

FEEDBACK

Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 208

Status of Fast IR Orbit Feedback at RHIC – 207

The Effect of Feedback on Penile Tumescence in Sexually Functional Men – 118

FEMALES

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138

FERROMAGNETIC MATERIALS

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 96

MBE Deposition of Epitaxial Fe1-xVx Films for Low-Loss Ghz Devices; Atomic-Scale Engineering of Magnetic Dynamics – 83

FEVER

Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120

FIBER OPTICS

Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67

Fiber Optic Sensor Attachment Development and Performance Evaluations – 224

Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72

High-Speed Fiber Bragg Grating Interrogation System Development – 158

FIELD EMISSION

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202

FIELD OF VIEW

MCAO at Gemini – 251

FIELD-PROGRAMMABLE GATE ARRAYS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

FIGHTER AIRCRAFT

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 11

FILM CONDENSATION

Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – 62

FILTRATION

Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64

FINITE DIFFERENCE THEORY

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

FINITE ELEMENT METHOD

Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation – 41

FINITE VOLUME METHOD

Three-Dimensional Finite-Volume EL-LAM Implementation – 184

FINLAND

Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final) – 38

FISSIONABLE MATERIALS

Nuclear Fuel Reprocessing: U.S. Policy Development – 215

FISSION

Innovative Fission Measurements with a Time Projection Chamber – 215

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58

FLAT PLATES

Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate – 90

FLEXIBILITY

Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240

FLIGHT CONTROL

2005 Engineering Annual Report – 267

Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls – 267

FLIGHT CREWS

In-Space Crew-Collaborative Task Scheduling – 144

Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143

FLIGHT INSTRUMENTS

Flight Display Integration – 17

FLIGHT MANAGEMENT SYSTEMS

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

FLIGHT SIMULATION

Aerocapture Benefits to Future Science Missions – 247

FLIGHT TESTS

A Brief Summary of the 2005 Pathfinder+ Aeroelastic/Turbulence Flight Tests – 9

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17

Hilbert-Huang Transform-Based Stability Spectral Analysis – 10

Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls – 267

NASA Crew Launch Vehicle Flight Test Process – 30

FLIGHT TRAINING

Reducing C-17 Pilot Training Delays – 7

FLOW CHARACTERISTICS

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

FLOW DISTRIBUTION

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

Turbulent Chemical Interaction Models in NCC: Comparison – 88

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

FLOW MEASUREMENT

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

FLOW REGULATORS

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 88

FLOW VELOCITY

Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64

FLOW VISUALIZATION

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

FLOW

Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183

- Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – [183](#)
- FLUID FLOW**
CHL Precision Flow Table - Description and Applications – [177](#)
- FLUORESCENCE**
Fluorescence Approaches to Growing Macromolecule Crystals – [35](#)
- FLUOROPOLYMERS**
Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – [43](#)
- FLUTTER**
Hilbert-Huang Transform-Based Stability Spectral Analysis – [10](#)
- FLUX PINNING**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – [45](#)
- FLYING PERSONNEL**
Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – [143](#)
- FOG**
High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – [115](#)
- FOOD INTAKE**
Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – [119](#)
Field Studies of Exercise and Food Dep-
rivation – [143](#)
- FORECASTING**
Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – [114](#)
Use of High-resolution WRF Simulations to Forecast Lightning Threat – [113](#)
- FORESTS**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – [101](#)
- FORMALISM**
A Common Knowledge Representation for Plan Generation and Reactive Execution – [152](#)
A Practical Nonmonotonic Theory for Reasoning About Speech Acts – [169](#)
Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – [172](#)
- FORMATION FLYING**
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – [213](#)
- FORMAT**
DyNetML: Interchange Format for Rich Social Network Data – [246](#)
- FOSSIL FUELS**
Reducing DoD Fossil-Fuel Dependence – [101](#)
- FOURIER TRANSFORMATION**
A Sublinear Algorithm of Sparse Fourier Transform for Nonequispaced Data – [201](#)
Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – [79](#)
The Analysis and Test of Phase Calibration – [260](#)
- FOUR-WAVE MIXING**
Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution – [76](#)
- FRACTURE MECHANICS**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – [97](#)
- FRACTURE STRENGTH**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – [97](#)
- FREE CONVECTION**
Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – [38](#)
Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – [61](#)
- FREE ELECTRON LASERS**
Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – [230](#)
Development of BPM Electronics at the JLAB FEL – [232](#)
- FREE VIBRATION**
Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – [62](#)
Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – [63](#)
- FREE-PISTON ENGINES**
Summary of Stirling Converter Testing at NASA Glenn Research Center – [88](#)
- FREQUENCIES**
Differential Space-Time Modulation for Wideband Wireless Networks – [168](#)
- FREQUENCY RESPONSE**
MFXRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – [61](#)
- FREQUENCY SHIFT KEYING**
Advanced Optical Modulators for Next-generation Photonic Networks – [219](#)
Experimental Study of a Burst-Switched WDM Network Testbed – [221](#)
- FRICTION**
Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – [48](#)
- FUEL CELLS**
Developing of Design Criteria for Highly Efficient Fuel Cells – [104](#)
- FUELS**
Global Energy and Aviation Concerns – [6](#)
- FURNACES**
Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – [229](#)
- FUSION REACTORS**
Graph-Based Methods for Orbit Classification – [149](#)
- FUSION**
Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06 – [227](#)
- GALACTIC CLUSTERS**
Studying High-z Galaxies with MCAO – [254](#)
- GALACTIC NUCLEI**
IRS-8 : A Galactic Black Sheep – [252](#)
- GALAXIES**
M31 Star Formation Histories – [249](#)
Science from NIFS System Verification – [252](#)
- GALERKIN METHOD**
A Discontinuous Galerkin Method for Two-Temperature Plasmas – [228](#)
- GALLIUM NITRIDES**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – [54](#)
- GAME THEORY**
Belief and Incompleteness – [196](#)
Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – [161](#)
Numerical Approximations for Non-Zero-Sum Stochastic Differential Games – [179](#)
Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Convergence Analysis – [197](#)
- GAMES**
Increasing Replayability with Deliberative and Reactive Planning – [156](#)
- GAMMA RAY BURSTS**
The GLAST Burst Monitor – [248](#)
- GAMMA RAYS**
Report on the Performance of a Large-Area, Gamma-Ray Imager for Search – [214](#)
- GAS DETECTORS**
Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – [72](#)

GAS DISSOCIATION

Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation – 186

GAS DYNAMICS

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 88

GAS GIANT PLANETS

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

The Birth of Planetary Systems – 247

The Gemini Planet Imager – 255

The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247

GAS PRESSURE

Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27

GAS TURBINE ENGINES

Dual Mode Power Unit Having a Compressor Bypass System – 14

Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27

High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27

Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14

GAS TURBINES

Advanced Seal Rig Experiments and Analysis – 25

Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency – 13

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211

Turbine Aerothermal Research – 15

GASTROINTESTINAL SYSTEM

Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – 125

GATES (CIRCUITS)

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202

GENE EXPRESSION REGULATION

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 129

GENE THERAPY

Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130

GENERAL OVERVIEWS

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 13

Geminis Adaptive Optics Program: An Overview – 250

In-Space Propulsion Technology Program Solar Electric Propulsion Technologies – 33

GENES

A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer – 136

Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 128

Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – 118

The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127

GENETIC ALGORITHMS

An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design – 148

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

GENETICS

EGFR Activation by Spatially Restricted Ligands – 131

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138

Signaling Pathways Controlling the Growth and Proliferation of Drosophila Perineurial Glial Cells – 122

GENOME

The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117

GEOGRAPHIC INFORMATION SYSTEMS

Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235

SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100

GEOMETRICAL OPTICS

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66

GEOMORPHOLOGY

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101

GEORGIA

Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 100

GERMANY

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary) – 37

GETTERS

A Report on Getter Pump for Hydrogen Maser – 257

GLASS

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228

GLOBAL POSITIONING SYSTEM

Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8

Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9

GPS Radio Occultation Data Processing System – 258

Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 259

GLOBAL WARMING

Our Changing Planet: The U.S. Climate Change Science Program for Fiscal Year 2007. A Supplement to the President's Budget for Fiscal Year 2007 – 113

GLUCOSE

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122

Microfabricated Multianalyte Sensor Arrays for Metabolic Monitoring – 123

GLYCOLS

Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly – 36

GRAMMARS

A Connectionist Treatment of Grammar for Generation: Relying on Emergents – 237

Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172

Semantic Tagging using a Probabilistic Context Free Grammar – 191

Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145

GRAPH THEORY

Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68

GRAPHICAL USER INTERFACE

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations – 145

GRAPHS (CHARTS)

Graphical Representation of Temporal Data from Simulations – 150

GRAVITATION

Recent Advances in Solar Sail Propulsion at NASA – 34

GREENHOUSE EFFECT

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

GRID GENERATION (MATHEMATICS)

Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 92

GROUND OPERATIONAL SUPPORT SYSTEM

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 23

GROUND STATE

Application of Density Functional Theory to Systems Containing Metal Atoms – 50

GROUND SUPPORT SYSTEMS

Ground Layer AO (GLAO): A 'Third Gemini' – 254

GROUND TESTS

A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 20

QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268

GROUND WATER

Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems – 100

GROUP DYNAMICS

A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 244

Multisites Coordination in Shared Multicast Trees – 164

GROWTH

Cysteine Variants of Erythropoietin – 204

GUIDANCE (MOTION)

Guidance of Nonlinear Systems – 18

GUNS (ORDNANCE)

Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40

First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes – 49

HABITABILITY

The Birth of Planetary Systems – 247

HABITATS

Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sterna Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005 – 244

HAMILTON-JACOBI EQUATION

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151

HANDBOOKS

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101

HANDWRITING

Machine Printed Text and Handwriting Identification in Noisy Document Images – 243

HAZARDS

NIOSH Health Hazard Evaluation Report: HETA No. 2000-0402-3021, Inova Fairfax Hospital, Falls Church, Virginia, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0030-3020, Carolinas Medical Center, Charlotte, North Carolina, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2004-0005-3024, Grove Park Inn Resort and Spa, Asheville, North Carolina, November 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006 – 106

HEALTH

NIOSH Health Hazard Evaluation Report: HETA No. 2000-0402-3021, Inova Fairfax Hospital, Falls Church, Virginia, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0030-3020, Carolinas Medical Center, Charlotte, North Carolina, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2004-0005-3024, Grove Park Inn Resort and Spa, Asheville, North Carolina, November 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006 – 106

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10

HEART DISEASES

Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – 123

Molecular Basis of Essential Thrombocytosis – 133

HEAT RESISTANT ALLOYS

Alloy Design of Nanoscale Precipitation Strengthened Alloys: Design of a Heat Treatable Aluminum Alloy Useful to 400 Degrees Celsius. Final Report – 52

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

HEAT SHIELDING

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91

HEAT TOLERANCE

Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143

Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142

HEAT TRANSFER

Turbine Aerothermal Research – 15

HEATERS

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 59

HEAVY IONS

Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06 – 227

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266

HEAVY LIFT LAUNCH VEHICLES

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32

HEAVY METALS

Phase Stability in Heavy f-Electron Metals from First-Principles Theory – 51

HELMET MOUNTED DISPLAYS

Flare Cue Symbolology for Zero-Zero Weather Landings – 5

HETEROGENEITY

Coverage in Heterogeneous Sensor Networks – 197

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42

HIERARCHIES

Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 244

MUC-3 Test Results and Analysis – 144

HIGH ENERGY ELECTRONS

High Energy Electron Transport in Solids – 206

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266

HIGH FREQUENCIES

High Frequency via With Stripped Semi-Rigid Cable – 203

High Frequency Via – 74

HIGH POWER LASERS

Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint) – 95

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

HIGH PRESSURE

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89

HIGH RESOLUTION

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80

Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99

HIGH REYNOLDS NUMBER

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 88

HIGH SPEED

Boost Logic: A High Speed Energy Recovery Circuit Family – 81

Experimental Study of a Burst-Switched WDM Network Testbed – 221

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87

High-Speed Fiber Bragg Grating Interrogation System Development – 158

Polarization-mode Dispersion and its Mitigation – 220

HIGH TEMPERATURE PLASMAS

Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225

HIGH TEMPERATURE

Design Rules for High Temperature Microchemical Systems – 48

High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27

MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54

Rotating Intershaft Brush Seal Project – 26

Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13

HIGH VOLTAGES

Impact of Solar Array Designs on High Voltage Operations – 30

HIGHWAYS

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97

HILBERT TRANSFORMATION

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17

Hilbert-Huang Transform-Based Stability Spectral Analysis – 10

Multi-Input Multi-Output Flight Data Analysis with HHT – 16

HISTORIES

Lunar e-Library: Putting Space History to Work – 262

HMX

Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44

HOHLRAUMS

Fundamentals of ICF Hohlräume – 226

Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203

Radiation-Driven Hydrodynamics of Long Pulse Hohlräume on the National Ignition Facility – 227

HOLOGRAPHY

Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175

HORMONES

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 128

The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

HOSPITALS

NIOSH Health Hazard Evaluation Report: HETA No. 2000-0402-3021, Inova Fairfax Hospital, Falls Church, Virginia, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006 – 107

HOT WORKING

Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53

HOVERING

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4

HUBBLE SPACE TELESCOPE

Studying High-z Galaxies with MCAO – 254

The GLAST Burst Monitor – 248

HULLS (STRUCTURES)

A Flexible Cymbal Array – 86

Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80

HUMAN BEINGS

The Effect of Feedback on Penile Tumescence in Sexually Functional Men – 118

HUMAN FACTORS ENGINEERING

Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146

HUMAN IMMUNODEFICIENCY VIRUS

Human Immunodeficiency Virus Type 1 (HIV-1) Viral Protein R (Vpr)-Mediated Cell Cycle Arrest: An Analysis of Current Mechanistic Models – 121

HUMAN RELATIONS

DyNetML: Interchange Format for Rich Social Network Data – 246

HUMAN-COMPUTER INTERFACE

A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146

Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – 152

HYBRID STRUCTURES

Semiconductor Lasers with Hybrid Materials Systems – 217

HYDRAULIC ANALOGIES

CHL Precision Flow Table - Description and Applications – 177

HYDRAULIC EQUIPMENT

Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89

HYDRAULIC FLUIDS

Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89

HYDROCARBONS

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

HYDRODYNAMICS

Radiation-Driven Hydrodynamics of Long Pulse Hohlraums on the National Ignition Facility – 227

HYDROGEN BONDS

Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 57

HYDROGEN MASERS

A Report on Getter Pump for Hydrogen Maser – 257

HYDROGEN SULFIDE

Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64

Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – 46

HYDROGEN

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258

HYDROLOGY

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101

Parameter Estimation Tools for Hydrologic and Hydraulic Simulations – 196

HYDROMETEORS

Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113

HYDROPHOBICITY

Composite, Nanostructured, Super-Hydrophobic Material – 41

HYDROPHONES

Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213

HYPERSONICS

An Update on Structural Seal Development at NASA GRC – 28

HYPERTENSION

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

HYPOTHESES

Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 6

HYSTERESIS

A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 58

ICE

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113

IDENTIFYING

Identifying Error in AUV Communication – 70

IGNITION

Ablation Loss Studies for Capillary - Sustained Plasmas – 228

Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39

Overview of Recent Progress in US Fast Ignition Research – 226

Radiation-Driven Hydrodynamics of Long Pulse Hohlraums on the National Ignition Facility – 227

The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89

IMAGE ANALYSIS

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237

IMAGE ENHANCEMENT

Machine Printed Text and Handwriting Identification in Noisy Document Images – 243

IMAGE PROCESSING

A Survey of Spatio-Temporal Grouping Techniques – 175

Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155

Foundations of Automatic Target Recognition – 175

Machine Printed Text and Handwriting Identification in Noisy Document Images – 243

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237

IMAGE RECONSTRUCTION

Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Post-print) – 173

IMAGE RESOLUTION

FLAMINGOS-2: A New MOS on the Block – 255

Hokupa'a: Gemini's First AO System – 249

Modeling and Estimation of Multiresolution Stochastic Processes – 193

Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194

Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data – 187

IMAGERY

Multiband Imagery for Concealed Weapon Detection – 92

IMAGING SPECTROMETERS

FLAMINGOS-2: A New MOS on the Block – 255

Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265

IMAGING TECHNIQUES

Adaptive Optics: A Core Gemini Program – 251

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

Gemini South Adaptive Optics Imager – 251

Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlraums – 203

Hokupa'a: Gemini's First AO System – 249

Imaging Performance of the Si/Ge Hybrid Compton Imager – 222

Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – [232](#)

Refining Functional Optical Imaging of the Breast with Quantum Dots – [129](#)

Science from NIFS System Verification – [252](#)

Searching for Planets with NICI – [253](#)

Some Discrete Approximations to a Variational Method for Image Segmentation – [187](#)

Super-Resolution Algorithms for Nondestructive Evaluation Imaging – [204](#)

Thermoreflectance Imaging of Superlattice Micro Refrigerators – [78](#)

IMMUNE SYSTEMS

The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – [126](#)

IMMUNITY

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – [135](#)

The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity – [121](#)

IMMUNOLOGY

Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – [125](#)

IMPACT DAMAGE

Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – [30](#)

IN SITU RESOURCE UTILIZATION

NASA In-Situ Resource Utilization Project-and Seals Challenges – [27](#)

Processing of Space Resources to Enable the Vision for Space Exploration – [263](#)

IN VITRO METHODS AND TESTS

The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells – [128](#)

INCENTIVES

Incentive-Compatible Interdomain Routing – [160](#)

INCINERATORS

Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – [64](#)

INDIA

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary) – [37](#)

Certain Colored Synthetic Organic Oleoresinous Pigment Dispersions from India. Investigation Nos. 701-TA-436 (Preliminary) and 731-TA-1042 (Preliminary) – [53](#)

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final) – [56](#)

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – [53](#)

INDONESIA

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final) – [56](#)

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – [53](#)

INDUCTION MOTORS

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – [61](#)

INDUSTRIAL MANAGEMENT

Industrial and Systems Engineering Applications in NASA – [60](#)

INDUSTRIAL PLANTS

Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – [105](#)

Recirculating Linac Muon Accelerator for Metrino Factory – [205](#)

INDUSTRIES

Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – [102](#)

Overview of NASA's Propulsion 21 Effort – [25](#)

INEQUALITIES

Delay-Dependent H(sub infinity) Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach – [63](#)

Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – [148](#)

INERTIAL CONFINEMENT FUSION

Fundamentals of ICF Hohlräume – [226](#)

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – [222](#)

INERTIA

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – [48](#)

INFARCTION

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – [120](#)

INFECTIOUS DISEASES

A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – [130](#)

Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – [125](#)

Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – [140](#)

Investigation of the Basis for Persistent Porin Serotypes of Neisseria Gonorrhoeae in Community Infections – [125](#)

Morphometric and Molecular Analyses of the Sand Fly Species Lutzomyia shannoni (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – [120](#)

Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – [117](#)

The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – [126](#)

INFORMATION DISSEMINATION

Managing Information Collection and Dissemination, Fiscal Year 2002 – [236](#)

INFORMATION MANAGEMENT

Rhetoric as Knowledge – [239](#)

INFORMATION RESOURCES MANAGEMENT

Managing Information Collection and Dissemination, Fiscal Year 2002 – [236](#)

INFORMATION RETRIEVAL

Comparing User-assisted and Automatic Query Translation – [244](#)

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – [244](#)

Java Implementation of a Single-Database Computationally Symmetric Private Information Retrieval (cSPIR) Protocol – [240](#)

Monitoring the News: A TDT Demonstration System – [234](#)

Overview of the Third Message Understanding Evaluation and Conference – [152](#)

Parsing and Tagging of Bilingual Dictionary – [242](#)

Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – [156](#)

Probabilistic Structured Query Methods – [245](#)

Rutgers Filtering Work at TREC 2002: Adaptive and Batch – [242](#)

Semantic Tagging using a Probabilistic Context Free Grammar – [191](#)

Structure Discovery in Sequentially Connected Data – 241

The Web as a Parallel Corpus – 243

INFORMATION SYSTEMS

Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235

Information Technology: DOD Needs to Ensure that Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers – 150

Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218

Organisational Structure and Information Technology (IT): Exploring the Implications of IT for Future Military Structures – 239

Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 75

Sentinel Audit II: Status of the Federal Bureau of Investigation's Case Management System – 236

INFORMATION THEORY

Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174

INFRARED DETECTORS

Fundamental Research on Infrared Detection – 93

Multiband Imagery for Concealed Weapon Detection – 92

INFRARED IMAGERY

Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command – 81

AO Imaging of Quasar Host Galaxies – 252

M31 Star Formation Histories – 249

INFRARED LASERS

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94

INFRARED RADAR

Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94

INFRARED RADIATION

Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82

Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 224

Mirror Technology Roadmap – 216

INFRARED TRACKING

Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163

INJECTION

Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229

Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84

INJURIES

Prevention of Cold Injuries During Exercise – 142

INSULATORS

Safety Core Insulator Failures Reliability Analysis – 79

INSULIN

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122

INTERNATIONAL COOPERATION

The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266

INTERNATIONAL SPACE STATION

NASA Crew Launch Vehicle Flight Test Process – 31

NASA's Exploration Architecture – 26

INTERNATIONAL TRADE

Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240

Artists' Canvas from China. Investigation No. 731-TA-1091 (Final) – 38

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary) – 37

Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – 52

Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review) – 51

EXPORT CONTROLS: Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Universities – 64

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary) – 49

Outboard Engines from Japan. Investigation No. 731-TA-1069 (Preliminary) – 32

Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final) – 37

INTERNETS

A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157

Group Coordination Support in Networked Multimedia Systems – 167

Incentive-Compatible Interdomain Routing – 160

Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66

Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet – 167

Multisites Coordination in Shared Multicast Trees – 164

Online Victimization: A Report on the Nation's Youth – 147

Online Victimization of Youth: Five Years Later – 147

Robustness of Path-Vector Protocols Without Independent Route Ranking – 198

The Web as a Parallel Corpus – 243

INTERPROCESSOR COMMUNICATION

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 245

Rhetoric as Knowledge – 238

INTERROGATION

High-Speed Fiber Bragg Grating Interrogation System Development – 158

INVENTIONS

Low Voltage Piezoelectric Composite for Transducer Applications – 85

Mast Wake Reduction by Shaping – 89

INVERSE SCATTERING

Direct and Inverse Scattering for Beltrami Fields – 189

INVERTERS

Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation – 103

ION ACCELERATORS

US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202

ION BEAMS

New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227

US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202

ION CYCLOTRON RADIATION

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 267

ION EXCHANGING

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

IONIZATION

Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – 210

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142

IONIZING RADIATION

Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142

IONOSPHERIC DISTURBANCES

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 260

IONS

2006 Gordon Research Conference on Molecular and Ionic Cluster. Final Progress Report – 201

IRIS SATELLITES

A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers – 63

IRRADIANCE

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

ISING MODEL

Multiple Walkers in the Wang-Landau Algorithm – 150

ISIS SATELLITES

ISIS Annual Report, 2005: Review of the Year – 204

ISIS Annual Report, 2005: The Facility – 206

ISOTHERMS

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 229

ISOTOPES

Non-Scaling FFAG for Rare Isotopes Production – 210

JAMES WEBB SPACE TELESCOPE

The First Light Machine – 223

JAPAN

Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review) – 51

Outboard Engines from Japan. Investigation No. 731-TA-1069 (Final) – 34

Outboard Engines from Japan. Investigation No. 731-TA-1069 (Preliminary) – 32

WTEC Panel Report on High-End Computing Research and Development in Japan – 150

JET AIRCRAFT NOISE

Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles – 16

Evaluation of Some Recent Jet Noise Reduction Concepts – 11

JET AIRCRAFT

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 110

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10

JET FLOW

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

JP-8 JET FUEL

The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89

KALMAN FILTERS

Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14

KENTUCKY

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97

KENYA

The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – 126

KINEMATICS

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188

Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257

KINETIC ENERGY

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

KINETICS

Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228

KNOWLEDGE BASED SYSTEMS

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Incremental Interpretation – 236

Knowledge Acquisition using an English-Based Method Editor – 177

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242

On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT – 176

The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245

The Logical Foundations of Evidential Reasoning (revised) – 183

KNOWLEDGE REPRESENTATION

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

The Role of Logic in Knowledge Representation and Commonsense Reasoning – 198

KOREA

Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – 52

LABYRINTH SEALS

Advanced Seal Rig Experiments and Analysis – 25

Brush Seals for Improved Steam Turbine Performance – 24

Mapping of Technological Opportunities-Labyrinth Seal Example – 25

Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25

LAGRANGIAN FUNCTION

Three-Dimensional Finite-Volume EL-LAM Implementation – 184

LANDFILLS

Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire – 106

LANDING GEAR

Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27

LANGUAGES

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 245

The MIT Summit Speech Recognition System: A Progress Report – 195

LARGE EDDY SIMULATION

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

LARGE SCALE INTEGRATION

Research and Development of High-Capacity Optical Link Technologies – 218

LARGE SPACE STRUCTURES

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 170

LASER APPLICATIONS

Advanced 2-micron Solid-state Laser for Wind and CO₂ Lidar Applications – 94

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

LASER BEAMS

Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint) – 95

LASER CAVITIES

Photonic Crystal Light Emitting Diodes – 95

LASER DAMAGE

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94

LASER DOPPLER VELOCIMETERS

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

LASER GUIDE STARS

Gemini's Laser Guide Star Facility – 249

MCAO at Gemini – 250

LASER INDUCED FLUORESCENCE

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

LASER MATERIALS

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

LASER OUTPUTS

Neutral Atom Lithography With Multi-Frequency Laser Fields – 47

LASER PLASMAS

Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225

LASER RANGING

The New SLR Ephemeris and its Application to Predicting Satellites – 259

LASER WINDOWS

Gemini's Laser Guide Star Facility – 249

LASERS

Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 224

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Fundamentals of ICF Hohlräume – 226

Materials Response under Extreme Conditions – 231

Photonic Crystal Light Emitting Diodes – 95

Quantum Network Consisting of Laser-cooled Ions and Photons – 77

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222

LAUNCH VEHICLE CONFIGURATIONS

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process – 20

LAUNCH VEHICLES

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22

Industrial and Systems Engineering Applications in NASA – 60

NASA Crew Launch Vehicle Flight Test Process – 30

RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22

The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 20

LAUNCHING

RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 33

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20

LAW (JURISPRUDENCE)

Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66

Online Victimization: A Report on the Nation's Youth – 147

LEADERSHIP

Branching Storylines in Virtual Reality Environments for Leadership Development – 155

Militant Ideology Atlas: Executive Report – 234

LEAKAGE

Brush Seals for Improved Steam Turbine Performance – 24

Elastomeric Seal Development for Advanced Docking/Berthing System – 26

Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27

Overview of NASA Glenn Seal Project – 29

LEARNING

Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – 153

LENSES

From Classical Adaptive Optics to MCAO – 252

Gemini's ALTAIR Adaptive Optics System – 249

LESIONS

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137

LIAPUNOV FUNCTIONS

Notes on Averaging Over Acyclic Diagrams and Discrete Coverage Control – 200

LIFE CYCLE COSTS

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

LIFE (DURABILITY)

Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

LIFT DEVICES

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 268

LIGANDS

EGFR Activation by Spatially Restricted Ligands – 131

LIGHT AMPLIFIERS

Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 224

LIGHT EMITTING DIODES

Photonic Crystal Light Emitting Diodes – 95

LIGHT SOURCES

Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230

Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207

Supercontinuum Generation and its Applications – 77

LIGHT TRANSMISSION

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220

LIGHT (VISIBLE RADIATION)

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

LIGHTNING

Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 112

Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113

LINE SPECTRA

The Analysis and Test of Phase Calibration – 260

LINEAR ACCELERATORS

Absorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230

Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230

Recirculating Linac Muon Accelerator for Mtrino Factory – 205

LINEAR OPERATORS

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

LINEAR QUADRATIC REGULATOR

Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63

LINEARITY

Direct and Inverse Scattering for Beltrami Fields – 189

LINGUISTICS

Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198

Conversation as Planned Behavior – 170

Incremental Interpretation – 236

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152

Metaphor, Metaphor Schemata, and Selective Inferencing – 170

Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172

The Error Is the Clue: Breakdown In Human-Machine Interaction – 163

The ICSI+ Multilingual Sentence Segmentation System – 197

LIQUID CRYSTALS

New Tools for Measurement of Personal Exposure to Chemical Environments – 46

LIQUID ROCKET PROPELLANTS

Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems – 34

LIQUIDS

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

LITHIUM

Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 229

LITHOGRAPHY

Neutral Atom Lithography With Multi-Frequency Laser Fields – 47

LOADS (FORCES)

A Comparison of Two Balance Calibration Model Building Methods – 189

Fiber Optic Sensor Attachment Development and Performance Evaluations – 224

Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls – 267

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

LOCAL AREA NETWORKS

COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188

OCDM Transmission Experiments on JGNII Test bed Optical Link – 219

LOCI

Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells – 122

LOCOMOTION

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127

LOGIC CIRCUITS

Cellular Gate Technology – 116

LOGIC

Hierarchical Autoepistemic Theories for Nonmonotonic Reasoning: Preliminary Report – 169

LOGISTICS

Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – 157

LOSSES

Ablation Loss Studies for Capillary - Sustained Plasmas – 228

LOW CONDUCTIVITY

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

LOW COST

Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9

LOW EARTH ORBITS

NASA Crew Launch Vehicle Flight Test Process – 31

Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20

LOW FREQUENCIES

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Miniature Low Frequency Acoustic Transmitter – 85

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

LOW GRAVITY MANUFACTURING

Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19

LOW TEMPERATURE ENVIRONMENTS

Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208

LOW TEMPERATURE

Identification of the Compounds Formed During the Low Temperature Heat Dispersal of o-Chlorobenzylidene Malononitrile (CS Riot Control Agent) – 46

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103

The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89

LOW THRUST

The Development of NASA's Low Thrust Trajectory Tool Set – 33

LOW VOLTAGE

Low Voltage Piezoelectric Composite for Transducer Applications – 85

LUMINOSITY

Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257

Luminosity Function and Segregation Effect of the Open Cluster NGC 6530 – 259

LUNAR ALBEDO

Radiation Dose from Lunar Neutron Albedo – 263

LUNAR GEOLOGY

A One-Piece Lunar Regolith-Bag Garage Prototype – 265

Requirements and Techniques for Developing and Measuring Simulant Materials – 266

LUNAR MAPS

Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265

LUNAR PROGRAMS

Lunar e-Library: Putting Space History to Work – 262

LUNAR ROCKS

Requirements and Techniques for Developing and Measuring Simulant Materials – 266

LUNAR SOIL

A One-Piece Lunar Regolith-Bag Garage Prototype – 265

LUNAR SURFACE

A One-Piece Lunar Regolith-Bag Garage Prototype – 265

Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264

LYMPHOCYTES

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135

MACH NUMBER

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91

MACHINE LEARNING

An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design – 148

MACHINE TRANSLATION

Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244

Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152

MUC-3 Test Results and Analysis – 144

Symbolic MT With Statistical NLP Components – 169

Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145

MACROMOLECULES

Fluorescence Approaches to Growing Macromolecule Crystals – 35

MAGELLANIC CLOUDS

M31 Star Formation Histories – 249

MAGNESIUM

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary) – 50

MAGNETIC FIELDS

General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208

MAGNETIC MOMENTS

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – 119

MAGNETIC RESONANCE

Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120

MAGNETITE

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – 119

MAGNETIZATION

Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84

MAGNETOHYDRODYNAMIC SIMULATION

GRMHD Simulations of Jet Formation with RAISHIN – 260

MAGNETOHYDRODYNAMICS

A Discontinuous Galerkin Method for Two-Temperature Plasmas – 228

MAGNETORESISTIVITY

Method for Fabricating Giant Magnetoresistive (GMR) Devices – 75

MAGNETOSTRICTION

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 96

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96

MAGNIFICATION

From Classical Adaptive Optics to MCAO – 252

MAIN SEQUENCE STARS

Gemini's ALTAIR Adaptive Optics System – 249

MAINTENANCE

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10

Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10

MALES

Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – 123

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119

The Effect of Feedback on Penile Tumescence in Sexually Functional Men – 118

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

MALONONITRILE

Identification of the Compounds Formed During the Low Temperature Heat Dispersal of o-Chlorobenzylidene Malononitrile (CS Riot Control Agent) – 46

MAMMARY GLANDS

A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134

Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells – 139

An Evaluation of Stereoscopic Digital Mammography for Earlier Detection of Breast Cancer and Reduced Rate of Recall – 126

Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer – 136

Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells – 121

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – 139

Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126

EGFR Activation by Spatially Restricted Ligands – 131

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

Endogenous 6-Hydroxylmelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – 132

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135

Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138

Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 128

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 136

Novel Therapeutic Approach for Breast Cancer – 134

Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129

- Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137
- Quality of Breast Cancer Care: The Role of Hispanic Ethnicity, Language, and Socioeconomic Position – 131
- Quasi-Prospective Study of Breast Cancer and Diet – 137
- Refining Functional Optical Imaging of the Breast with Quantum Dots – 129
- The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141
- The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells – 128
- Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139
- Undergraduate Training in Mammary Gland Biology and Breast Cancer – 133
- MAN MACHINE SYSTEMS**
The Error Is the Clue: Breakdown In Human-Machine Interaction – 163
- MANAGEMENT PLANNING**
Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240
Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21
- MANAGEMENT SYSTEMS**
Sentinel Audit II: Status of the Federal Bureau of Investigation's Case Management System – 236
- MANEUVERS**
Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146
- MANNED SPACE FLIGHT**
Composites Damage Tolerance Workshop – 42
- MANUALS**
Classification Management Tutorial – 240
The DARPA/DMA Image Understanding Testbed SYSTEM MANAGER'S MANUAL. Version 2.0 – 239
- MANUFACTURING**
Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006) – 101
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- MANY BODY PROBLEM**
Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216
- MAPPING**
Mapping WorldNet Senses to a Lexical Database of Verbs – 237
- MAPS**
Allocating AUVs for Mine Map Development in MCM – 101
- MARKERS**
Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 138
- MARKING**
Parsing and Tagging of Bilingual Dictionary – 243
Semantic Tagging using a Probabilistic Context Free Grammar – 191
- MASONRY**
Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation – 41
- MASS SPECTROSCOPY**
Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – 108
- MASS**
Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261
Very Low-mass Binaries – 253
- MATCHED FILTERS**
Design of Optical Matched Filters – 93
- MATHEMATICAL LOGIC**
The Logical Foundations of Evidential Reasoning (revised) – 184
- MATHEMATICAL MODELS**
A Comparison of Two Balance Calibration Model Building Methods – 189
A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 19
Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155
Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63
Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110
Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153
Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14
- Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56
- Moment Closure for the Stochastic Logistic Model – 190
- Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42
- Parameter Estimation Tools for Hydrologic and Hydraulic Simulations – 196
- Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99
- Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – 118
- Turbulent Chemical Interaction Models in NCC: Comparison – 88
- MATRICES (MATHEMATICS)**
A Randomized Algorithm for the Approximation of Matrices – 180
- MAXIMUM LIKELIHOOD ESTIMATES**
HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80
- MAXWELL EQUATION**
Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – 210
Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216
- MEASUREMENT**
A Typology for C2 Measures – 68
Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120
- MECHANICAL ENGINEERING**
Overview of the SNS Accelerator Mechanical Engineering – 205
- MECHANICAL PROPERTIES**
Composites Damage Tolerance Workshop – 42
Materials Response under Extreme Conditions – 231
- MELATONIN**
Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140
- MELTS (CRYSTAL GROWTH)**
Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38
- MEMBRANES**
Design and Synthesis of Oriented Guest-Host Nanostructures For Enhanced Membrane Performances – 103

- Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- MENTAL HEALTH**
Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120
- MERCURY (PLANET)**
Mercury Sample Return using Solar Sails – 264
- MESOMETEOROLOGY**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 100
- MESSAGE PROCESSING**
Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
Dynamics of a Loop-Free Path-Finding Algorithm – 163
Overview of Results of the MUC-6 Evaluation – 238
Overview of the Third Message Understanding Evaluation and Conference – 152
Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems – 144
- MESSAGES**
Militant Ideology Atlas: Executive Report – 235
Overview of the Third Message Understanding Evaluation and Conference – 152
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- METABOLIC DISEASES**
Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122
Microfabricated Multianalyte Sensor Arrays for Metabolic Monitoring – 123
- METABOLISM**
Microfabricated Multianalyte Sensor Arrays for Metabolic Monitoring – 123
Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians – 118
Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy – 137
- METADATA**
The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237
- METAL FILMS**
Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 14
- METAL OXIDES**
Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55
- METAL PLATES**
Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 64
- METAL SURFACES**
Metallic Seal Development for Advanced Docking/Berthing System – 52
- METALS**
Application of Density Functional Theory to Systems Containing Metal Atoms – 50
High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27
- METASTASIS**
Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135
- METEORITES**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- METEORITIC COMPOSITION**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- METEORITIC MICROSTRUCTURES**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- METEOROLOGICAL PARAMETERS**
Cognitive Network Computer for Atmospheric Monitoring – 115
- METEOROLOGY**
Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
- METHYL COMPOUNDS**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44
- METROLOGY**
Generation and Characterization of Attosecond Pulses – 208
- MICE**
Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141
- MICROANALYSIS**
Conversation as Planned Behavior – 170
- MICROCRYSTALS**
Fluorescence Approaches to Growing Macromolecule Crystals – 35
- MICROELECTROMECHANICAL SYSTEMS**
Phase Calibration of Microphones by Measurement in the Free-field – 211
- MICROELECTRONICS**
Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78
- MICROFLUIDIC DEVICES**
Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- MICROGRAVITY**
Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38
- MICROORGANISMS**
Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64
Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- MICROPARTICLES**
Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48
- MICROPHONES**
Phase Calibration of Microphones by Measurement in the Free-field – 211
- MICROSTRUCTURE**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50
- MICROWAVE ANTENNAS**
Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- MICROWAVE TRANSMISSION**
Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
High Frequency Via – 74

MICROWAVES

High Frequency via With Stripped Semi-Rigid Cable – 203

MIDDLE EAST

The Middle East Television Network: An Overview – 69

MILITARY OPERATIONS

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Increasing Replayability with Deliberative and Reactive Planning – 156

Terrain Study of Hunter Liggett Military Reservation, Camp Reberts and Hearst Estate – 98

Terrain Study of Hunter Liggett Military Reservation, Camp Roberts and Hearst Estate – 98

MILITARY PERSONNEL

Field Studies of Exercise and Food Deprivation – 143

Reducing C-17 Pilot Training Delays – 6

Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117

MILITARY TECHNOLOGY

Militant Ideology Atlas: Research Compendium – 234

MILKY WAY GALAXY

IRS-8 : A Galactic Black Sheep – 252

MILLIMETER WAVES

Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 76

MIMO (CONTROL SYSTEMS)

Multi-Input Multi-Output Flight Data Analysis with HHT – 16

MINERALOGY

Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265

MINERALS

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

MINIATURIZATION

Miniature Low Frequency Acoustic Transmitter – 85

MIR SPACE STATION

Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247

MIRRORS

Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216

FLAMINGOS-2: A New MOS on the Block – 255

From Classical Adaptive Optics to MCAO – 251

Hokupa'a: Gemini's First AO System – 249

Mirror Technology Roadmap – 216

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223

The First Light Machine – 223

MISSILES

Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command – 81

Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82

MITOCHONDRIA

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

MIXTURES

Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

MOBILE COMMUNICATION SYSTEMS

Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – 192

Scheduling and Control of Multi-Node Mobile Communications Systems With Randomly-Varying Channels by Stability Methods – 196

MODELS

Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – 268

Cross-Document Coreference on a Large Scale Corpus – 190

Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206

TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245

MODULATION

Differential Space-Time Modulation for Wideband Wireless Networks – 168

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

Modulation System for Communication – 65

Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78

System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222

MODULATORS

Advanced Optical Modulators for Next-generation Photonic Networks – 219

EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission – 221

Experimental Study of a Burst-Switched WDM Network Testbed – 221

MODULES

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

MOISTURE

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 99

MOLECULAR BEAM EPITAXY

MBE Deposition of Epitaxial Fe_{1-x}V_x Films for Low-Loss GHz Devices; Atomic-Scale Engineering of Magnetic Dynamics – 83

MOLECULAR BIOLOGY

EGFR Activation by Spatially Restricted Ligands – 131

MOLECULAR CHAINS

A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 58

MOLECULAR CLUSTERS

2006 Gordon Research Conference on Molecular and Ionic Cluster. Final Progress Report – 201

MOLECULAR PROPERTIES

The Molecular Basis of Canavan Disease: Aspartoacylase Enzyme Characteristics – 124

MOLECULAR STRUCTURE

Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120

MONITORS

The GLAST Burst Monitor – 248

MONTE CARLO METHOD

Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28

MOON

Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264

Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265

MOTION

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48

MOUNTAINS

A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101

MULLITES

Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55

MULTICHANNEL COMMUNICATION

Differential Space-Time Modulation for Wideband Wireless Networks – 168

MULTIDISCIPLINARY RESEARCH

Power of Partnership – 147

MULTIMEDIA

Group Coordination Support in Networked Multimedia Systems – 167

MULTIPATH TRANSMISSION

Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet – 167

MULTIPLE ACCESS

Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163

Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67

MULTIPLEXING

A Study for Technology of Controlling Next-Generation Backbone Network – 219

EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission – 221

Experimental Study of a Burst-Switched WDM Network Testbed – 221

Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 75

Supercontinuum Generation and its Applications – 77

MULTISCALE MODELS

Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – 194

Multiscale Smoothing Error Models – 194

Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction – 195

MULTISENSOR FUSION

Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194

MUONS

ISIS Annual Report, 2005: Review of the Year – 204

ISIS Annual Report, 2005: The Facility – 206

Recirculating Linac Muon Accelerator for Metrinno Factory – 205

MUSCLES

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127

MUTATIONS

A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134

NANOCCLUSERS

Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanosstructure Synthesis – 42

NANOCOMPOSITES

Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37

Preparation of Nanocomposites of Alumina and Titania – 53

NANOPARTICLES

Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94

Reversible Nanoparticle Electronics – 210

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing – 140

NANOSTRUCTURE (CHARACTERISTICS)

NanoElectronics and BioElectronics – 75

NANOSTRUCTURES (DEVICES)

Design and Synthesis of Oriented Guest-Host Nanostructures For Enhanced Membrane Performances – 103

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanosstructure Synthesis – 42

Spin Coherence in Semiconductor Nanostructures – 233

Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light- Up Colorimetric Sensing – 140

WTEC Panel Report on Spin Electronics – 75

NANOTECHNOLOGY

Computational Nanoelectronics and Nanotechnology at NASA ARC – 86

NanoElectronics and BioElectronics – 75

Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – 119

NARROWBAND

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

NASA PROGRAMS

An Update on Structural Seal Development at NASA GRC – 28

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

C-20A Precision Autopilot Development – 9

Computational Nanoelectronics and Nanotechnology at NASA ARC – 86

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 12

Industrial and Systems Engineering Applications in NASA – 60

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23

Technology Transition a Model for Infusion and Commercialization – 143

The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 20

NASA SPACE PROGRAMS

In-Space Propulsion Technology Program Solar Electric Propulsion Technologies – 33

NASA In-Situ Resource Utilization Project-and Seals Challenges – 27

Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43

Processing of Space Resources to Enable the Vision for Space Exploration – 263

The Development of NASA's Low Thrust Trajectory Tool Set – 33

NATURAL LANGUAGE (COMPUTERS)

A Deduction Model of Belief and Its Logics – 172

Conversation as Planned Behavior – 170

Incremental Interpretation – 236

Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – 152

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152

Metaphor, Metaphor Schemata, and Selective Inferencing – 170

- MUC-4 Test Results and Analysis – 238
- Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems – 144
- Symbolic MT With Statistical NLP Components – 169
- Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145
- Utterance and Objective: Issues in Natural Language Communication – 171
- NATURAL LANGUAGE PROCESSING**
- Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198
- Conversation as Planned Behavior – 170
- Incremental Interpretation – 236
- Metaphor, Metaphor Schemata, and Selective Inferencing – 170
- Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172
- Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems – 144
- The Error Is the Clue: Breakdown In Human-Machine Interaction – 163
- The ICSI+ Multilingual Sentence Segmentation System – 197
- NAUSEA**
- Sulfonamide Cannabinoid Agonists and Antagonists – 37
- NAVIER-STOKES EQUATION**
- Reduced Navier-Stokes Equations Near a Flow Boundary – 89
- NAVIGATION AIDS**
- Flare Cue Symbolology for Zero-Zero Weather Landings – 5
- Flight Display Integration – 17
- NAVIGATION**
- Monitoring Completed Navigation Projects, Lessons Learned IV – 115
- NAVY**
- Information Technology: DOD Needs to Ensure that Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers – 150
- Information Technology: DOD Needs to Ensure That Navy Marine Corps Intranet Program Is Meeting Goals and Satisfying Customers – 159
- NEAR INFRARED RADIATION**
- Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
- NIFS at Gemini North – 255
- Refining Functional Optical Imaging of the Breast with Quantum Dots – 129
- Searching for Planets with NICI – 253
- NEBULAE**
- M31 Star Formation Histories – 249
- Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- NEOPLASMS**
- Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 138
- The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141
- NERVES**
- Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 57
- Development of a Rapid Decontamination System for the Nerve Agents – 49
- Structural Analysis and Bioengineering of Thermostable *Pyrococcus furiosus* Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification – 48
- NETHERLANDS**
- Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final) – 38
- NETWORKS**
- A Connectionist Treatment of Grammar for Generation: Relying on Emergents – 237
- Coverage in Heterogeneous Sensor Networks – 197
- Dynamic Importance Sampling for Queuing Networks – 192
- DyNetML: Interchange Format for Rich Social Network Data – 246
- Efficient Routing in Packet-Radio Networks Using Link-State Information – 67
- Group Coordination Support in Networked Multimedia Systems – 167
- Notes on Averaging Over Acyclic Digraphs and Discrete Coverage Control – 200
- Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – 156
- R&D Activities of Photonic Networks in the World – 221
- NEURAL NETS**
- Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3
- Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
- NEUTRAL ATOMS**
- Neutral Atom Lithography With Multi-Frequency Laser Fields – 47
- NEUTRINOS**
- Recirculating Linac Muon Accelerator for Metriano Factory – 205
- NEUTRON COUNTERS**
- Micro Neutron Detectors – 73
- NEUTRON SOURCES**
- China Spallation Neutron Source Accelerators: Design, Research, and Development – 207
- Overview of the SNS Accelerator Mechanical Engineering – 205
- Single Particle Beam Dynamics Design of BSNS/RCS – 205
- NEUTRON SPECTRA**
- Radiation Dose from Lunar Neutron Albedo – 263
- NEUTRONS**
- Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
- Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
- ISIS Annual Report, 2005: Review of the Year – 204
- ISIS Annual Report, 2005: The Facility – 206
- Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206
- NEW YORK CITY (NY)**
- Study of Ambient Air Contaminants and Asthma in New York City, Parts A and B – 108
- NICKEL ALLOYS**
- Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216
- Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53
- NICKEL CADMIUM BATTERIES**
- Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- NIGHT**
- Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140
- NIOBIUM ALLOYS**
- Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53
- NITROGEN OXIDES**
- Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 112
- NITROGEN**
- Electromagnetically Induced Transparency in Semiconductors – 84
- Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation – 186

NOISE INTENSITY

An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 61

NOISE REDUCTION

Evaluation of Some Recent Jet Noise Reduction Concepts – 11

MFURLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61

Robust Wavelet Thresholding for Noise Suppression – 212

NONDESTRUCTIVE TESTS

Super-Resolution Algorithms for Nondestructive Evaluation Imaging – 204

Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10

NONLINEAR EQUATIONS

Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181

NONLINEAR OPTICS

Modeling Complex Nonlinear Optical Systems – 225

NONLINEAR SYSTEMS

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 95

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96

Guidance of Nonlinear Systems – 18

Modeling Complex Nonlinear Optical Systems – 225

Rotation Prevents Finite-Time Breakdown – 177

NONLINEARITY

Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 96

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96

Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

Optical Signal Processing using Fiber Nonlinearity – 221

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211

NORMALIZED DIFFERENCE VEGETATION INDEX

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 99

NUCLEAR FUELS

Nuclear Fuel Reprocessing: U.S. Policy Development – 215

NUCLEAR FUSION

Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225

NUCLEAR MAGNETIC RESONANCE

Spin Decoherence Measurements for Solid State Qubits – 214

Student Support: Spin Decoherence Measurements for Solid State Qubits – 233

NUCLEAR PHYSICS

Proposal for a High Energy Nuclear Database – 209

NUCLEAR RADIATION

Soft Radiative Strength in Warm Nuclei – 215

NUCLEAR REACTIONS

Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203

NUCLEI

Soft Radiative Strength in Warm Nuclei – 215

NUCLEON-NUCLEON INTERACTIONS

Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 207

NUMERICAL ANALYSIS

A Randomized Algorithm for the Approximation of Matrices – 181

Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151

Numerical Study of X-Ray Diffraction Effects within Objects – 231

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

Student Support: Spin Decoherence Measurements for Solid State Qubits – 233

OBESITY

Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians – 119

OBSERVATORIES

Adaptive Optics: A Core Gemini Program – 251

Gemini Focus: Newsletter of the Gemini Observatory – 248

Gemini South Science Highlights – 254

Gemini Adaptive Optics Program: An Overview – 250

Ground Layer AO (GLAO): A 'Third Gemini' – 254

Hokupa'a: Gemini's First AO System – 249

MCAO at Gemini – 250

NIFS at Gemini North – 255

Very Low-mass Binaries – 253

OCEAN MODELS

Ocean Tide Models Performance in Coastal Regions – 116

OCEAN SURFACE

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

OCEANS

Ocean Tide Models Performance in Coastal Regions – 116

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

OILS

Reducing DoD Fossil-Fuel Dependence – 101

OLIGOMERS

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

OMNIDIRECTIONAL ANTENNAS

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165

Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166

ONCOGENES

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

ON-LINE SYSTEMS

Online Victimization of Youth: Five Years Later – 147

Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28

ONTOGENY

Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247

OPEN CLUSTERS

Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257

Luminosity Function and Segregation Effect of the Open Cluster NGC 6530 – 259

Membership and Spatial Motion of Young Open Cluster NGC 2244 – 259

OPERATORS (MATHEMATICS)

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

OPTICAL COMMUNICATION

Advanced Optical Modulators for Next-generation Photonic Networks – 219

Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220

Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218

OPTICAL CONTROL

Experiments of a Terabit-Class Super-Network – 220

Gemini South Adaptive Optics Imager – 251

OPTICAL DATA PROCESSING

Experimental Study of a Burst-Switched WDM Network Testbed – 222

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220

OCDM Transmission Experiments on JGNII Test bed Optical Link – 219

Optical Signal Processing using Fiber Nonlinearity – 221

OPTICAL EQUIPMENT

Advanced Optical Modulators for Next-generation Photonic Networks – 219

Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 224

Experimental Study of a Burst-Switched WDM Network Testbed – 221

Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19

Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77

OPTICAL FIBERS

Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution – 76

Optical Signal Processing using Fiber Nonlinearity – 221

Polarization-mode Dispersion and its Mitigation – 220

Research and Development of High-Capacity Optical Link Technologies – 218

Supercontinuum Generation and its Applications – 77

OPTICAL FILTERS

Design of Optical Matched Filters – 93

OPTICAL MATERIALS

Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19

OPTICAL MEASUREMENT

Remote Sensing of Alpha and Beta Sources Modeling Summary – 43

OPTICAL MEASURING INSTRUMENTS

Cepheids in Multiple Systems: ADS 14859 – 256

Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

OPTICAL PATHS

A Study for Technology of Controlling Next-Generation Backbone Network – 219

OPTICAL PROPERTIES

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Optical Coatings and Surfaces in Space: MISSE – 217

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

OPTICAL SWITCHING

Compact, Portable Pulsed-Power – 201

Optically Controlled Photonic Switch – 217

Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220

OPTIMIZATION

Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8

The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11

ORBITS

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

ORGANELLES

Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 117

ORGANIC CHEMISTRY

Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43

ORGANIC COMPOUNDS

Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 40

ORGANIC PHOSPHORUS COMPOUNDS

Structural Analysis and Bioengineering of Thermostable *Pyrococcus furiosus* Phosphatase for Optimization of Organophosphorus Nerve Agent Detoxification – 48

ORGANIZATIONS

Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240

Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240

Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235

NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23

Organisational Structure and Information Technology (IT): Exploring the Implications of IT for Future Military Structures – 239

OSCILLATIONS

An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211

OSMOSIS

Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46

OUTER RADIATION BELT

Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110

OVARIES

EGFR Activation by Spatially Restricted Ligands – 131

OXIDATION

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

- Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
- The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89
- OXYGEN ATOMS**
 MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- Optical Coatings and Surfaces in Space: MISSE – 217
- OXYGEN**
 Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72
- Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129
- OZONE**
 Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 112
- P WAVES**
 The Analysis and Test of Phase Calibration – 260
- PACKET SWITCHING**
 A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164
- A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157
- Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166
- Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163
- Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165
- Dynamics of a Loop-Free Path-Finding Algorithm – 163
- Multisites Coordination in Shared Multicast Trees – 164
- OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165
- Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220
- Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166
- Studies on Architecture and Control Technology for Optical Packet Switches – 218
- PAIR PRODUCTION**
 Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 207
- PARABOLIC REFLECTORS**
 Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004 – 102
- PARALLEL PROCESSING (COMPUTERS)**
 Parallelization of a Blind Deconvolution Algorithm (Postprint) – 184
- PARAMETER IDENTIFICATION**
 Parameter Estimation Tools for Hydrologic and Hydraulic Simulations – 196
- PARAMETERIZATION**
 A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17
- PARAMETRIC AMPLIFIERS**
 Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 224
- PARASITES**
 Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – 125
- PARASITIC DISEASES**
 The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – 126
- PARSING ALGORITHMS**
 Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152
- Parsing and Tagging of Bilingual Dictionary – 242
- PARTIAL DIFFERENTIAL EQUATIONS**
 Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181
- Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems – 178
- Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Examples and Numerics – 181
- PARTICLE ACCELERATORS**
 Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
- Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Development of BPM Electronics at the JLAB FEL – 232
- Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
- High Performance Computing in Accelerating Structure Design and Analysis – 229
- Instabilities in NB(sup3)SN Wires – 229
- Performance of a Nanometer Resolution BPM System – 231
- PARTICLE BEAMS**
 Single Particle Beam Dynamics Design of BSNS/RCS – 205
- PARTICLE INTERACTIONS**
 Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142
- PARTICLE PRODUCTION**
 Open and Hidden Charm Production at RHIC and LHC – 202
- PARTICLE SPIN**
 Spin Coherence in Semiconductor Nanostructures – 234
- PARTICULATES**
 TOXCON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 105
- PATCH ANTENNAS**
 Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- PATENT APPLICATIONS**
 A Flexible Cymbal Array – 86
- Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly – 36
- Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Composite, Nanostructured, Super-Hydrophobic Material – 41
- Composite, Ordered Material Having Sharp Surface Features – 41
- Cysteine Variants of Erythropoietin – 204
- Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor – 72
- Electrosynthesis of Nanofibers and Nano-Composite Films – 35
- Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202
- High Frequency via With Stripped Semi-Rigid Cable – 202
- High Frequency Via – 74
- Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
- Low Voltage Piezoelectric Composite for Transducer Applications – 85
- Mast Wake Reduction by Shaping – 89
- Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37
- Method to Estimate Noise in Data – 195
- Methods and Systems for Autonomously Managing a Network – 149

- Micro Neutron Detectors – 73
- Miniature Low Frequency Acoustic Transmitter – 85
- Modulation System for Communication – 65
- Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- Optically Controlled Photonic Switch – 217
- Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements – 75
- Preparation of Nanocomposites of Alumina and Titania – 53
- Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41
- Process for the Production of Emulsions and Dispersions – 43
- Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35
- Semiconductor Lasers with Hybrid Materials Systems – 217
- Sense Amplifier for Static Random Access Memories – 73
- Sulfonamide Cannabinoid Agonists and Antagonists – 37
- Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55
- System and Method for Producing Terahertz Radiation – 201
- Three-Dimensional Display Assembly – 86
- Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- PATHOGENESIS**
- Molecular Basis of Essential Thrombocytosis – 134
- PATHOGENS**
- Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140
- PATHS**
- Experiments of a Terabit-Class Super-Network – 220
- PATIENTS**
- Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120
- Patient Race and Outcome Preferences as Predictors of Urologists Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer – 127
- PATTERN RECOGNITION**
- A Survey of Spatio-Temporal Grouping Techniques – 175
- Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170
- Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
- Parsing and Tagging of Bilingual Dictionary – 242
- Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PRE-PRINT) – 173
- Shaped-Based Recognition of 3D Objects From 2D Projections – 175
- Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146
- Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
- PAYLOADS**
- Recent Advances in Solar Sail Propulsion at NASA – 34
- PENETRATION**
- Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56
- PERFORMANCE TESTS**
- Fiber Optic Sensor Attachment Development and Performance Evaluations – 224
- PERIODIC VARIATIONS**
- On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – 179
- PERSONNEL**
- Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240
- In-Space Crew-Collaborative Task Scheduling – 144
- PERTURBATION**
- Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems – 178
- Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – 118
- PESTICIDES**
- Results from the Swedish National Screening 2005. Subreport 2. Biocides – 45
- PETROLEUM PRODUCTS**
- Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40
- PHARMACOLOGY**
- Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- PHASE LOCKED SYSTEMS**
- Research on the Sampling Offset about Satellite Navigation Receiver – 258
- PHASE MODULATION**
- Differential Space-Time Modulation for Wideband Wireless Networks – 168
- PHASE SHIFT KEYING**
- Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
- PHASE TRANSFORMATIONS**
- Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44
- PHASED ARRAYS**
- Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223
- PHENOTYPE**
- Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – 132
- PHOSPHORYLATION**
- A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123
- PHOTODECOMPOSITION**
- Development of a Rapid Decontamination System for the Nerve Agents – 49
- PHOTOGRAMMETRY**
- Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications – 4
- PHOTOGRAPHIC MEASUREMENT**
- Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications – 4
- PHOTOMETERS**
- Fundamental Research on Infrared Detection – 93
- PHOTONICS**
- Advanced Optical Modulators for Next-generation Photonic Networks – 219
- Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222
- Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82
- Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77
- Optically Controlled Photonic Switch – 217
- Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220
- R&D Activities of Photonic Networks in the World – 221

PHOTONS

Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77

Polarized Single-Photons on Demand - A New Source for Quantum Information – 215

Secure Communication with Quantum Cryptography – 76

Status of Development of Photon Number Resolving Detectors – 76

PHOTOVOLTAIC CONVERSION

Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation – 103

Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – 102

PHYSICAL EXERCISE

Field Studies of Exercise and Food Deprivation – 143

Ideas on Multi-layer Dialogue Management for Multi-party, Multi-conversation, Multi-modal Communication (Extended Abstract of Invited Talk), – 69

Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70

Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108

Prevention of Cold Injuries During Exercise – 142

Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142

Thermoregulatory Control Following Dynamic Exercise – 138

Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175

PHYSICAL OPTICS

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66

PHYSIOLOGICAL EFFECTS

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations – 145

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

PHYSIOLOGICAL RESPONSES

Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143

Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142

The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity – 121

PHYSIOLOGY

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations – 145

PICOSECOND PULSES

Optical Signal Processing using Fiber Nonlinearity – 221

PIEZOELECTRIC TRANSDUCERS

A Flexible Cymbal Array – 86

Low Voltage Piezoelectric Composite for Transducer Applications – 85

PIEZOELECTRICITY

Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

Low Voltage Piezoelectric Composite for Transducer Applications – 85

PIGMENTS

Certain Colored Synthetic Organic Oleoresinous Pigment Dispersions from India. Investigation Nos. 701-TA-436 (Preliminary) and 731-TA-1042 (Preliminary) – 53

PILOT TRAINING

Reducing C-17 Pilot Training Delays – 7

PILOTLESS AIRCRAFT

A Brief Summary of the 2005 Pathfinder+ Aeroelastic/Turbulence Flight Tests – 9

C-20A Precision Autopilot Development – 9

PILOTS

Reducing C-17 Pilot Training Delays – 7

PINNING

Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94

PIPES (TUBES)

Certain Circular Welded Carbon Quality Line Pipe from China, Korea, and Mexico. Investigation Nos. 731-TA-1073-1075 (Preliminary) – 52

Development of Permanent Mechanical Repair Sleeve for Plastic Pipe – 55

PITUITARY HORMONES

Cysteine Variants of Erythropoietin – 204

PIXELS

Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Post-print) – 173

PLANETARY EVOLUTION

The Birth of Planetary Systems – 247

PLANETARY ORBITS

The Birth of Planetary Systems – 247

PLANETARY SYSTEMS

Gemini South Science Highlights – 255

The Birth of Planetary Systems – 247

The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247

PLANETS

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

PLANNING

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Increasing Replayability with Deliberative and Reactive Planning – 156

PLASMA GENERATORS

Ablation Loss Studies for Capillary - Sustained Plasmas – 228

Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87

PLASMA JETS

Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35

PLASMA PHYSICS

Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225

PLASMA SPRAYING

Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51

PLASMA WAVES

Bent Marshak Waves – 261

PLASMAS (PHYSICS)

A Discontinuous Galerkin Method for Two-Temperature Plasmas – 228

Ablation Loss Studies for Capillary - Sustained Plasmas – 228

Interpretation of Diamagnetic Signals – 205

Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35

PLASTIC DEFORMATION

Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50

PLATELETS

Molecular Basis of Essential Thrombocytosis – 134

PLATES (STRUCTURAL MEMBERS)

Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 64

PLUMES

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

PNEUMONIA

The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity – 121

POLARIMETERS

Canadian Led X-ray Polarimeter Mission CXP – 262

POLARIZATION

Polarization-mode Dispersion and its Mitigation – 220

POLICIES

Information Security: Agencies Need to Develop and Implement Adequate Policies for Periodic Testing – 151

Nuclear Fuel Reprocessing: U.S. Policy Development – 215

Policy-Aware Connectionless Routing – 166

POLLUTION CONTROL

Arizona Department of Environmental Quality, Title V Operating Permit Program Evaluation – 108

Maricopa County Environmental Services Department, Title V Operating Permit Program Evaluation – 107

TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 104

POLYCARBOSILANES

Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 57

POLYCHLORINATED BIPHENYLS

Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174

POLYCRYSTALS

Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006) – 102

POLYETHYLENE TEREPHTHALATE

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final) – 56

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – 53

POLYETHYLENES

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – 53

POLYIMIDES

MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54

POLYMERIZATION

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54

POLYMERS

A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 58

Low Voltage Piezoelectric Composite for Transducer Applications – 85

Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41

POLYNOMIALS

An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – 199

Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – 183

POPULATIONS

Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235

Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137

PORPHYRINS

Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55

PORTABLE EQUIPMENT

A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants – 160

Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations – 145

POSEIDON SATELLITE

Ocean Tide Models Performance in Coastal Regions – 116

POSITION (LOCATION)

Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – 162

Hierarchical Bayesian Approach to Locating Seismic Events – 190

HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80

Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments – 184

Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162

SeRLoc: Robust Localization for Wireless Sensor Networks – 162

Wireline ITS Communications Training: Year 1 Report of Activities – 65

POWER REACTORS

Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264

PRECIPITATES

Fluorescence Approaches to Growing Macromolecule Crystals – 35

PRECIPITATION HARDENING

Alloy Design of Nanoscale Precipitation Strengthened Alloys: Design of a Heat Treatable Aluminum Alloy Useful to 400 Degrees Celsius. Final Report – 52

PREDICTIONS

Another Analytical Approach to Predicting Munition Trajectories – 111

Patient Race and Outcome Preferences as Predictors of Urologists Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer – 127

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

The New SLR Ephemeris and its Application to Predicting Satellites – 258

PREPARATION

Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration – 36

PREVENTION

Prevention of Cold Injuries During Exercise – 142

PRIVACY

Privacy-Preserving Distributed Information Sharing – 242

PROBABILITY THEORY

A General Probabilistic Model for Improving Key Assignment in Wireless Networks – 68

A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 19

Probabilistic Structured Query Methods – 245

Technology Transition a Model for Infusion and Commercialization – 143

The Logical Foundations of Evidential Reasoning (revised) – 183

PROBLEM SOLVING

Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181

Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242

PROCEDURES

Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration – 36

PRODUCTION PLANNING

Annual Technical Progress Report of Radioisotope Power System Materials Production and Technology Program Tasks for October 1, 2004 through September 30, 2005 – 73

PROGRAM VERIFICATION (COMPUTERS)

Parallel Randomized State-Space Search – 174

Using SPARK-Ada to Model and Verify a MILS Message Router – 155

PROGRAMMING LANGUAGES

TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245

PROGRESS

Overview of Recent Progress in US Fast Ignition Research – 226

Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232

PROJECT PLANNING

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

PROJECTILES

Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56

PROJECTORS

Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command – 81

PROPELLER BLADES

Active Control of Blade Tonals in Underwater Vehicles – 214

PROPULSION SYSTEM CONFIGURATIONS

Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems – 34

PROPULSION SYSTEM PERFORMANCE

Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems – 34

High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27

PROPULSION

2005 Engineering Annual Report – 267

Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22

Overview of NASA's Propulsion 21 Effort – 25

Recent Advances in Solar Sail Propulsion at NASA – 33

PROSTATE GLAND

A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – 130

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

Caveolin-1 Modulates Androgen Receptor Signaling in Advanced Prostate Cancer – 131

Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130

Patient Race and Outcome Preferences as Predictors of Urologists Treatment Recommendations and Referral Patterns in Early-Stage Prostate Cancer – 127

Prostate Cancer Detection by Molecular Urinalysis – 136

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer – 132

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

PROTECTION

Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240

PROTECTIVE COATINGS

First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes – 49

PROTECTORS

Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143

PROTEINS

Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells – 139

Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells – 121

EGFR Activation by Spatially Restricted Ligands – 131

Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

Fluorescence Approaches to Growing Macromolecule Crystals – 35

Human Immunodeficiency Virus Type 1 (HIV-1) Viral Protein R (Vpr)-Mediated Cell Cycle Arrest: An Analysis of Current Mechanistic Models – 121

Novel Therapeutic Approach for Breast Cancer – 134

Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy – 137

The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141

Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127

PROTEOME

A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123

PROTOCOL (COMPUTERS)

A Model of Onion Routing With Provable Anonymity – 167

A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164

A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157

A Study for Technology of Controlling Next-Generation Backbone Network – 219

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Channel Sharing of Competing Flows in Ad Hoc Networks – 165

Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163

Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165

Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – 161

Dynamics of a Loop-Free Path-Finding Algorithm – 163

Incentive-Compatible Interdomain Routing – 160

Java Implementation of a Single-Database Computationally Symmetric Private Information Retrieval (cSPIR) Protocol – 240

Multisites Coordination in Shared Multicast Trees – 164

Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165	PURITY Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53	Student Support: Spin Decoherence Measurements for Solid State Qubits – 233
Robustness of Path-Vector Protocols Without Independent Route Ranking – 198	PYRIMIDINES Mechanism of Hormonal Regulation of CAD Gene Expression in Human Breast Cancer Cells – 129	QUANTUM WELLS Electromagnetically Induced Transparency in Semiconductors – 84
Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166	QUADRATURE PHASE SHIFT KEYING Experimental Study of a Burst-Switched WDM Network Testbed – 222	Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
Strand Spaces: Why is a Security Protocol Correct? – 161	QUALITY CONTROL Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint) – 95	QUARKS Open and Hidden Charm Production at RHIC and LHC – 202
Token Ring Protocol for Dynamic Ad-hoc Wireless Environments – 148	QUALITY Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet – 167	QUARTZ Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55
PROTON BEAMS Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209	QUANTUM CHROMODYNAMICS Open and Hidden Charm Production at RHIC and LHC – 202	QUASARS AO Imaging of Quasar Host Galaxies – 253
PROTOSTARS Stellar Properties of Embedded Protostars: Progress and Prospects – 262	QUANTUM COMMUNICATION Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution – 76	QUEUEING THEORY Channel Sharing of Competing Flows in Ad Hoc Networks – 165
PROTOTYPES A One-Piece Lunar Regolith-Bag Garage Prototype – 265	Status of Development of Photon Number Resolving Detectors – 76	Dynamic Importance Sampling for Queueing Networks – 192
Actuator Trade-Off Analysis for DARPA/BOSS Prototype II – 83	QUANTUM COMPUTATION Quantum Network Consisting of Laser-cooled Ions and Photons – 77	RACES (ANTHROPOLOGY) Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians – 119
Experiments of a Terabit-Class Super-Network – 220	QUANTUM COMPUTERS Quantum Network Consisting of Laser-cooled Ions and Photons – 77	RADIAL VELOCITY Membership and Spatial Motion of Young Open Cluster NGC 2244 – 259
Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220	QUANTUM CRYPTOGRAPHY Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 76	RADIANT HEATING Bent Marshak Waves – 261
PROVING R&D Activities of Photonic Networks in the World – 221	Secure Communication with Quantum Cryptography – 76	RADIATION DAMAGE Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142
PUBLIC HEALTH Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117	Status of Development of Photon Number Resolving Detectors – 76	RADIATION DETECTORS Micro Neutron Detectors – 73
PULSE RATE Bayesian Multidimensional Scaling and Choice of Dimension – 178	QUANTUM DOTS Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78	RADIATION DOSAGE Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230
PULSED LASERS Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – 210	Refining Functional Optical Imaging of the Breast with Quantum Dots – 129	Optical Coatings and Surfaces in Space: MISSE – 217
Optical Signal Processing using Fiber Nonlinearity – 221	Spin Coherence in Semiconductor Nanostructures – 233	Radiation Dose from Lunar Neutron Albedo – 263
Pinning Enhancement of YBa ₂ Cu ₃ O _{7-d} Thin Films with Y ₂ BaCuO ₅ Nanoparticles – 94	QUANTUM MECHANICS Quantum Network Consisting of Laser-cooled Ions and Photons – 77	RADIATION SOURCES Report on the Performance of a Large-Area, Gamma-Ray Imager for Search – 214
PULSES Generation and Characterization of Attosecond Pulses – 208	QUANTUM NUMBERS Spin Coherence in Semiconductor Nanostructures – 234	RADIATION THERAPY Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 137
PUMPS A Report on Getter Pump for Hydrogen Maser – 257	QUANTUM THEORY Integration with Respect to Operator-Valued Measures with Applications to Quantum Estimation Theory – 233	Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139
PUPILS Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 225	Polarized Single-Photons on Demand - A New Source for Quantum Information – 215	
	Spin Coherence in Semiconductor Nanostructures – 233	

RADIATIVE TRANSFER

Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113

RADIO ALTIMETERS

Ocean Tide Models Performance in Coastal Regions – 116

RADIO ASTRONOMY

Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 257

RADIO EQUIPMENT

Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7

RADIO FREQUENCIES

Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202

RADIO OCCULTATION

GPS Radio Occultation Data Processing System – 258

RADIO SIGNALS

Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8

Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67

RADIOACTIVE ISOTOPES

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

RADIOACTIVE WASTES

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

RADIOISOTOPE BATTERIES

Annual Technical Progress Report of Radioisotope Power System Materials Production and Technology Program Tasks for October 1, 2004 through September 30, 2005 – 73

Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103

RADIOTELEPHONES

Cognitive Network Computer for Atmospheric Monitoring – 115

Efficient Routing in Packet-Radio Networks Using Link-State Information – 67

Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – 156

RADOMES

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66

RANDOM ACCESS MEMORY

Sense Amplifier for Static Random Access Memories – 73

RANDOM VARIABLES

A Randomized Algorithm for the Approximation of Matrices – 181

An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – 199

Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 192

RANGEFINDING

The New SLR Ephemeris and its Application to Predicting Satellites – 259

RANKING

Robustness of Path-Vector Protocols Without Independent Route Ranking – 199

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110

RATES (PER TIME)

Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 258

Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257

RATS

Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – 123

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119

RAY TRACING

Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66

REACTION KINETICS

Computational Prediction of Kinetic Rate Constants – 47

Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – 124

REACTIVITY

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Increasing Replayability with Deliberative and Reactive Planning – 156

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – 124

READING

Improving the Communication of Geographic Patterns of Disease through Computer-Based Tools – 146

REAL TIME OPERATION

Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments – 184

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

Real-time Motion Tracking from a Mobile Robot – 185

RECEIVERS

Design of Optical Matched Filters – 93

RECEPTION DIVERSITY

Differential Space-Time Modulation for Wideband Wireless Networks – 168

RECLAMATION

Nuclear Fuel Reprocessing: U.S. Policy Development – 215

RECONFIGURABLE HARDWARE

Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78

REENTRY VEHICLES

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

REENTRY

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

REFINING

Refined Large Deviation Asymptotics for the Classical Occupancy Problem – 182

Refining Functional Optical Imaging of the Breast with Quantum Dots – 129

REFRACTING TELESCOPES

From Classical Adaptive Optics to MCAO – 252

REFRACTIVITY

ASR-9 Refractivity Measurements Using Ground Targets – 112

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

REFRACTORY METAL ALLOYS

Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51

REFRIGERATORS

Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207

Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78

REFUELING

Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3

REGOLITH

A One-Piece Lunar Regolith-Bag Garage Prototype – 265

REGRESSION ANALYSIS

Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18

REGULATIONS

Arizona Department of Environmental Quality, Title V Operating Permit Program Evaluation – 108

EXPORT CONTROLS: Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Universities – 64

Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43

RELATIVITY

GRMHD Simulations of Jet Formation with RAISHIN – 260

RELIABILITY ANALYSIS

Safety Core Insulator Failures Reliability Analysis – 79

RELIABILITY

Advanced Thermal HPT Clearance Control – 15

Analysis of Availability and Reliability in RHIC Operations – 209

Safety Core Insulator Failures Reliability Analysis – 79

REMOTE CONTROL

An Examination of Remote Access Help Desk Cases – 161

REMOTE SENSING

Remote Sensing of Alpha and Beta Sources Modeling Summary – 43

SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100

Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99

Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99

REMOTELY PILOTED VEHICLES

Air Force Organizational Adoption of Remotely Piloted Vehicles – 11

RENEWABLE ENERGY

Global Energy and Aviation Concerns – 6

REPUBLIC OF SOUTH AFRICA

Certain Aluminum Plate from South Africa. Investigation No. 731-TA-1056 (Final) – 52

RESEARCH AND DEVELOPMENT

CCLRC (Council for the Central Laboratory of the Research Councils) Annual Report and Accounts, 2005-2006 – 206

Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220

R&D Activities of Photonic Networks in the World – 221

The Scientific Research and Technical Work of Shanghai Astronomical Observatory in 2005 – 257

WTEC Panel Report on Spin Electronics – 75

RESEARCH FACILITIES

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

Innovative Fission Measurements with a Time Projection Chamber – 215

RESEARCH MANAGEMENT

Predictability and Diagnosis of Low-Frequency Climate Processes in the Pacific – 114

RESEARCH

Student Research Accomplishments, 2004-2005 – 98

RESINS

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final) – 56

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – 53

RESPONSES

Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119

RESTORATION

Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108

REYNOLDS NUMBER

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91

Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

RIBONUCLEIC ACIDS

EGFR Activation by Spatially Restricted Ligands – 131

RICCATTI EQUATION

Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data – 188

RING CURRENTS

Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110

Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266

RISK

Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132

Endogenous 6-Hydroxymelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – 140

Our Changing Planet: The U.S. Climate Change Science Program for Fiscal Year 2007. A Supplement to the President's Budget for Fiscal Year 2007 – 112

Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137

Quasi-Prospective Study of Breast Cancer and Diet – 137

Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117

RIVERS

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96

Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97

ROADS

Hybrid Drive Partnerships Keep the Army on the Right Road – 60

Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – 156

ROBOTICS

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

Aerocapture Benefits to Future Science Missions – 246

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 169

Monitoring Environmental Boundaries with a Robotic Sensor Network – 185

NASA's Exploration Architecture – 26

ROBOTS

Analysis of Dynamic Task Allocation in Multi-Robot Systems – 193

Real-time Motion Tracking from a Mobile Robot – 185

Shake the Robot – 171

ROBUSTNESS (MATHEMATICS)

Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – 148

Robustness of Path-Vector Protocols Without Independent Route Ranking – 198

ROCKET ENGINE DESIGN

A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 20

ROCKET ENGINES

RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 33

ROCKET LAUNCHING

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

ROCKET TEST FACILITIES

A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 20

RODENTS

Amygdala, Anxiety and Alpha(1) Adrenoceptors: Investigations Utilizing a Rodent Model of Traumatic Stress – 125

ROTATING SHAFTS

Brush Seals for Improved Steam Turbine Performance – 24

Rotating Intershaft Brush Seal Project – 26

ROTATION

Rotation Prevents Finite-Time Breakdown – 178

Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62

ROTORS

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4

Numerical Simulations and an Experimental Investigation of a Finger Seal – 28

ROUTES

Robustness of Path-Vector Protocols Without Independent Route Ranking – 199

RUSSIAN FEDERATION

Certain Hot-Rolled Flat-Rolled Carbon-Quality Steel Products from Brazil, Japan, and Russia. Investigations Nos. 701-TA-384 and 731-TA-806-808 (Review) – 51

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary) – 49

SAFETY

NIOSH Health Hazard Evaluation Report: HETA No. 2000-0402-3021, Inova Fairfax Hospital, Falls Church, Virginia, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0030-3020, Carolinas Medical Center, Charlotte, North Carolina, November 2006 – 106

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2004-0005-3024, Grove Park Inn Resort and Spa, Asheville, North Carolina, November 2006 – 107

NIOSH Health Hazard Evaluation Report: HETA No. 2005-0291-3025, University of Dayton Research Institute, Dayton, Ohio, October 2006 – 106

Online Victimization of Youth: Five Years Later – 147

Safety Core Insulator Failures Reliability Analysis – 79

SAMPLE RETURN MISSIONS

Mercury Sample Return using Solar Sails – 264

SAMPLERS

Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 40

SAMPLING

Dynamic Importance Sampling for Queueing Networks – 192

Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 192

Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Examples and Numerics – 181

SANDS

Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120

SATELLITE IMAGERY

Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99

SATELLITE INSTRUMENTS

Multiple Usage of Existing Satellite Sensors (PREPRINT) – 23

Multiple Usage of Existing Satellite Sensors – 23

SATELLITE LASER RANGING

Satellite Laser Ranging Observations at the Shanghai Astronomical Observatory in 2005 – 260

Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257

SATELLITE NAVIGATION SYSTEMS

Research on the Sampling Offset about Satellite Navigation Receiver – 258

SATELLITE OBSERVATION

Multiple Usage of Existing Satellite Sensors (PREPRINT) – 23

Multiple Usage of Existing Satellite Sensors – 23

SCALARS

Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182

Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149

SCALE MODELS

Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42

SCALERS

Bayesian Multidimensional Scaling and Choice of Dimension – 178

SCATTERING

Direct and Inverse Scattering for Beltrami Fields – 189

Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74

SCHEDULES

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

SCHEDULING

In-Space Crew-Collaborative Task Scheduling – 144

Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – 192

Scheduling and Control of Multi-Node Mobile Communications Systems With Randomly-Varying Channels by Stability Methods – 196

SCHOTTKY DIODES

Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103

SCORING

Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – 186

SCREENS

Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257

SEALERS

Metallic Seal Development for Advanced Docking/Berthing System – 52

SEALING

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29

Numerical Simulations and an Experimental Investigation of a Finger Seal – 28

- Rotating Intershaft Brush Seal Project – 26
- SEALS (STOPPERS)**
- An Update on Structural Seal Development at NASA GRC – 28
- Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27
- High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29
- High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27
- Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
- NASA In-Situ Resource Utilization Project-and Seals Challenges – 27
- Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25
- SECURITY**
- Classification Management Tutorial – 240
- Information Security: Agencies Need to Develop and Implement Adequate Policies for Periodic Testing – 151
- Power of Partnership – 146
- Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174
- Strand Spaces: Why is a Security Protocol Correct? – 161
- SEEPAGE**
- Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- SEGMENTS**
- Compressed Video Segmentation – 171
- Parsing and Tagging of Bilingual Dictionary – 242
- The ICSI+ Multilingual Sentence Segmentation System – 197
- SEISMIC WAVES**
- Advances in Mixed Signal Processing for Regional and Teleseismic Arrays – 191
- SEISMOLOGY**
- Hierarchical Bayesian Approach to Locating Seismic Events – 190
- Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110
- SELECTION**
- Bayesian Multidimensional Scaling and Choice of Dimension – 178
- SELF CONSISTENT FIELDS**
- Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 231
- SELF ORGANIZING SYSTEMS**
- Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240
- SEMANTICS**
- An Image Schema Language – 172
- Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153
- Metaphor, Metaphor Schemata, and Selective Inferencing – 170
- MUC-3 Test Results and Analysis – 144
- Semantic Tagging using a Probabilistic Context Free Grammar – 191
- Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145
- SEMICONDUCTING FILMS**
- Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94
- SEMICONDUCTOR DEVICES**
- Computational Nanoelectronics and Nanotechnology at NASA ARC – 86
- Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor – 72
- Micro Neutron Detectors – 73
- SEMICONDUCTOR LASERS**
- Semiconductor Lasers with Hybrid Materials Systems – 217
- SEMICONDUCTORS (MATERIALS)**
- Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor – 72
- Electromagnetically Induced Transparency in Semiconductors – 84
- Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
- Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216
- Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 75
- Spin Coherence in Semiconductor Nanostructures – 233
- Student Support: Spin Decoherence Measurements for Solid State Qubits – 233
- SEMISPAN MODELS**
- Computational Simulation of Semispan Wings in Wind Tunnels – 2
- SENSITIVITY**
- Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186
- Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138
- Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – 152
- Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
- SENSORS**
- Fiber Optic Sensor Attachment Development and Performance Evaluations – 224
- SENSORY PERCEPTION**
- Mapping WorldNet Senses to a Lexical Database of Verbs – 237
- SENTENCES**
- The ICSI+ Multilingual Sentence Segmentation System – 198
- SENTINEL SYSTEM**
- Sentinel Audit II: Status of the Federal Bureau of Investigation's Case Management System – 236
- SEQUENCING**
- A Survey of Spatio-Temporal Grouping Techniques – 175
- An Appearance Based Approach for Human and Object Tracking – 187
- Mapping of Technological Opportunities-Labyrinth Seal Example – 25
- SEQUENTIAL ANALYSIS**
- Advances in Mixed Signal Processing for Regional and Teleseismic Arrays – 191
- SEQUENTIAL CONTROL**
- Cellular Gate Technology – 116
- SERUMS**
- Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129
- SERVICE LIFE**
- Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- SERVOMOTORS**
- Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63
- SEX**
- Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132
- Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66
- The Effect of Feedback on Penile Tumescence in Sexually Functional Men – 118
- SHAFTS (MACHINE ELEMENTS)**
- Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27
- Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25
- Rotating Intershaft Brush Seal Project – 26

SHALLOW WATER

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

SHAPE MEMORY ALLOYS

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 15

SHAPES

Foundations of Automatic Target Recognition – 175

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

Mast Wake Reduction by Shaping – 89

Shape Memory Polymer Therapeutic Devices for Stroke – 54

SHEAR STRESS

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38

Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 63

SHIELDING

Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264

SHIPS

Mast Wake Reduction by Shaping – 90

SHOCK WAVES

Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199

SHOT NOISE

Design of Optical Matched Filters – 93

Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77

SHRINKAGE

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17

SIDEBANDS

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 80

SIGNAL DETECTION

Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78

Software Realization Method of Extracting VLBI Phase Calibration Signal – 259

SIGNAL DETECTORS

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

SIGNAL MEASUREMENT

Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77

Review of the National Institute of Information and Communications Technology, Volume 52, No. 3 – 75

SIGNAL PROCESSING

Advances in Mixed Signal Processing for Regional and Teleseismic Arrays – 191

Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220

Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79

SIGNAL TRANSMISSION

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission – 221

SILICON CARBIDES

Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103

SILICON

Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 78

SILOXANES

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

SIMPLIFICATION

Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149

SIMULATION

A Comparison of Two Balance Calibration Model Building Methods – 189

Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79

Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261

Evaluation of Multi-Party Reality Dialogue Interaction – 155

Increasing Replayability with Deliberative and Reactive Planning – 156

Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – 183

Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation – 186

Parameter Estimation Tools for Hydrologic and Hydraulic Simulations – 196

Requirements and Techniques for Developing and Measuring Simulant Materials – 266

Research on the Sampling Offset about Satellite Navigation Receiver – 258

Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – 3

SINGLE CRYSTALS

Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency – 13

SITUATIONAL AWARENESS

Flight Display Integration – 17

SLAGS

Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55

SLEEVES

Development of Permanent Mechanical Repair Sleeve for Plastic Pipe – 56

SLIDING

Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63

SMOKE

NIOSH Health Hazard Evaluation Report: HETA No. 2001-0066-3019, Morton Plant Hospital, Dunedin, Florida, October 2006 – 107

SMOOTHING

Multiscale Smoothing Error Models – 194

SNOW

High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115

SODIUM SILICATES

Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55

SOFTWARE DEVELOPMENT TOOLS

Pervasive Computing (PvC) ... and Its Impact on Next Generation Army Systems – 157

TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245

Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158

SOFTWARE ENGINEERING

A Common Knowledge Representation for Plan Generation and Reactive Execution – 152

Advanced Tool Integration for Embedded System Assurances – 157

Carving Differential Unit Test Cases from System Test Cases – 154

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 12

WTEC Panel Report on High-End Computing Research and Development in Japan – 150

SOILS

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

Terrain Study of Hunter Liggett Military Reservation, Camp Reberts and Hearst Estate – 98

Terrain Study of Hunter Liggett Military Reservation, Camp Roberts and Hearst Estate – 98

SOLAR ARRAYS

Impact of Solar Array Designs on High Voltage Operations – 30

SOLAR CELLS

Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006) – 102

SOLAR COLLECTORS

Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004 – 102

SOLAR ELECTRIC PROPULSION

In-Space Propulsion Technology Program Solar Electric Propulsion Technologies – 33

SOLAR ENERGY

Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation – 103

SOLAR FLUX

Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113

SOLAR PHYSICS

The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266

SOLAR POWERED AIRCRAFT

A Brief Summary of the 2005 Pathfinder+ Aeroelastic/Turbulence Flight Tests – 9

SOLAR RADIATION

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

SOLAR SAILS

Mercury Sample Return using Solar Sails – 264

Recent Advances in Solar Sail Propulsion at NASA – 33

SOLAR SYSTEM

Gemini Focus: Newsletter of the Gemini Observatory – 248

Gemini Adaptive Optics Program: An Overview – 250

Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004 – 102

The Birth of Planetary Systems – 247

SOLAR WIND

Global Energy and Aviation Concerns – 6

SOL-GEL PROCESSES

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

SOLID OXIDE FUEL CELLS

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 104

SOLID PHASES

Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 57

Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 39

SOLID PROPELLANT ROCKET ENGINES

NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process – 20

SOLID STATE LASERS

Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94

April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217

SOLID STATE

Compact, Portable Pulsed-Power – 201

Materials Response under Extreme Conditions – 231

Spin Decoherence Measurements for Solid State Qubits – 214

Student Support: Spin Decoherence Measurements for Solid State Qubits – 233

SOLID WASTES

Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64

SOLIDS

High Energy Electron Transport in Solids – 206

SOLUBILITY

Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57

SOLVENTS

Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40

SONAR

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

SOOT

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 110

SORBENTS

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

SOUND GENERATORS

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

SOUND TRANSMISSION

Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80

SOUND WAVES

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79

SPACE DEBRIS

Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 30

SPACE EXPLORATION

A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22

Aerocapture Benefits to Future Science Missions – 246

- In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59
- NASA Crew Launch Vehicle Flight Test Process – 30
- NASA's Exploration Architecture – 26
- Processing of Space Resources to Enable the Vision for Space Exploration – 263
- RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32
- The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 20
- SPACE MANUFACTURING**
- Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- SPACE MISSIONS**
- Canadian Led X-ray Polarimeter Mission CXP – 262
- Industrial and Systems Engineering Applications in NASA – 60
- Mercury Sample Return using Solar Sails – 264
- NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23
- NASA In-Situ Resource Utilization Project-and Seals Challenges – 27
- The Development of NASA's Low Thrust Trajectory Tool Set – 33
- The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247
- SPACE PROCESSING**
- Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- Processing of Space Resources to Enable the Vision for Space Exploration – 263
- SPACE RENDEZVOUS**
- Boom Rendezvous Alternative Docking Approach – 31
- SPACE SHUTTLE BOOSTERS**
- NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process – 20
- SPACE SHUTTLE MAIN ENGINE**
- RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 33
- SPACE SHUTTLE ORBITERS**
- Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 30
- SPACE SHUTTLES**
- Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
- NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23
- NASA's Exploration Architecture – 26
- Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43
- Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- SPACE TRANSPORTATION**
- A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22
- The Crossbow Air Launch Trade Space – 5
- SPACEBORNE TELESCOPES**
- Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- SPACECRAFT CONFIGURATIONS**
- Boom Rendezvous Alternative Docking Approach – 31
- SPACECRAFT DESIGN**
- Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 170
- Impact of Solar Array Designs on High Voltage Operations – 30
- RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32
- SPACECRAFT DOCKING**
- Boom Rendezvous Alternative Docking Approach – 31
- Elastomeric Seal Development for Advanced Docking/Berthing System – 26
- Metallic Seal Development for Advanced Docking/Berthing System – 52
- SPACECRAFT LAUNCHING**
- A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22
- Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21
- SPACECRAFT ORBITS**
- Boom Rendezvous Alternative Docking Approach – 31
- SPACECRAFT PROPULSION**
- Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems – 34
- SPACECREWS**
- In-Space Crew-Collaborative Task Scheduling – 144
- SPACE-TIME FUNCTIONS**
- Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – 168
- SPALLATION**
- China Spallation Neutron Source Accelerators: Design, Research, and Development – 207
- First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes – 49
- Overview of the SNS Accelerator Mechanical Engineering – 205
- SPARKS**
- Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- SPATIAL DEPENDENCIES**
- SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100
- SPATIAL DISTRIBUTION**
- The Nyquist Stability Criterion for a Class of Spatially Periodic Systems – 178
- SPATIAL RESOLUTION**
- Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 100
- Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99
- SPECKLE INTERFEROMETRY**
- Cepheids in Multiple Systems: ADS 14859 – 256
- SPECTRAL METHODS**
- Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199
- Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199
- SPECTRA**
- On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – 179
- SPECTROGRAPHS**
- FLAMINGOS-2: A New MOS on the Block – 255
- NIFS at Gemini North – 255
- SPECTROSCOPY**
- Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
- Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy – 137
- Studying High-z Galaxies with MCAO – 254
- SPECTRUM ANALYSIS**
- Hilbert-Huang Transform-Based Stability Spectral Analysis – 10
- SPEECH RECOGNITION**
- The MIT Summit Speech Recognition System: A Progress Report – 195
- SPEECH**
- A Practical Nonmonotonic Theory for Reasoning About Speech Acts – 169

- Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – [156](#)
- Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – [152](#)
- Limited Domain Synthesis of Expressive Military Speech for Animated Characters – [70](#)
- SPHERICAL HARMONICS**
- General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – [208](#)
- SPIN**
- WTEC Panel Report on Spin Electronics – [75](#)
- SPONTANEOUS COMBUSTION**
- The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – [89](#)
- SPORES**
- Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – [108](#)
- SPREADING**
- Efficient Symbol-Spreading Strategies for Wireless Communication – [71](#)
- SPREADSHEETS**
- Methods and Systems for Autonomously Managing a Network – [149](#)
- STABILITY TESTS**
- Hilbert-Huang Transform-Based Stability Spectral Analysis – [10](#)
- Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems – [178](#)
- STABILITY**
- Instabilities in NB(sup3)SN Wires – [229](#)
- On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – [179](#)
- Performance of a Nanometer Resolution BPM System – [231](#)
- Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – [192](#)
- Scheduling and Control of Multi-Node Mobile Communications Systems With Randomly-Varying Channels by Stability Methods – [196](#)
- The Nyquist Stability Criterion for a Class of Spatially Periodic Systems – [178](#)
- STANDARDIZATION**
- Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – [186](#)
- STAPHYLOCOCCUS**
- Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – [117](#)
- STAR CLUSTERS**
- Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – [257](#)
- Membership and Spatial Motion of Young Open Cluster NGC 2244 – [259](#)
- STAR FORMATION**
- Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – [261](#)
- Gemini Focus: Newsletter of the Gemini Observatory – [248](#)
- M31 Star Formation Histories – [249](#)
- Stellar Properties of Embedded Protostars: Progress and Prospects – [262](#)
- STATIC DEFORMATION**
- Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – [64](#)
- STATISTICAL ANALYSIS**
- A Randomized Algorithm for the Approximation of Matrices – [181](#)
- Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – [168](#)
- Cross-Document Coreference on a Large Scale Corpus – [190](#)
- Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – [153](#)
- Semantic Tagging using a Probabilistic Context Free Grammar – [191](#)
- Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – [99](#)
- STATISTICAL CORRELATION**
- Use of High-resolution WRF Simulations to Forecast Lightning Threat – [113](#)
- STATISTICAL DISTRIBUTIONS**
- Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – [203](#)
- Polarization-mode Dispersion and its Mitigation – [220](#)
- STEAM TURBINES**
- Brush Seals for Improved Steam Turbine Performance – [24](#)
- STEELS**
- Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – [47](#)
- STELLAR EVOLUTION**
- The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – [248](#)
- STELLAR MASS**
- AO Imaging of Quasar Host Galaxies – [253](#)
- STELLAR MOTIONS**
- Membership and Spatial Motion of Young Open Cluster NGC 2244 – [259](#)
- STELLAR TEMPERATURE**
- Stellar Properties of Embedded Protostars: Progress and Prospects – [262](#)
- STEM CELLS**
- Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – [124](#)
- STERIODS**
- Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – [132](#)
- STIFFNESS**
- Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – [268](#)
- STIRLING CYCLE**
- Summary of Stirling Converter Testing at NASA Glenn Research Center – [88](#)
- STOCHASTIC PROCESSES**
- An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – [199](#)
- An Interim Report of Research on Stochastic and Adaptive Systems – [191](#)
- Analysis of Dynamic Task Allocation in Multi-Robot Systems – [193](#)
- Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – [194](#)
- Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – [183](#)
- Modeling and Estimation of Multiresolution Stochastic Processes – [193](#)
- Moment Closure for the Stochastic Logistic Model – [190](#)
- Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – [194](#)
- Multiscale Smoothing Error Models – [194](#)
- Numerical Approximations for Non-Zero-Sum Stochastic Differential Games – [179](#)
- Numerical Approximations for Stochastic Systems With Delays in the State and Control – [180](#)
- Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – [192](#)
- Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – [118](#)
- Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction – [195](#)
- STRAIN GAGE BALANCES**
- A Comparison of Two Balance Calibration Model Building Methods – [189](#)
- Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – [18](#)

STRAIN GAGES

Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 14

STRAIN RATE

Materials Response under Extreme Conditions – 231

STRANDS

Strand Spaces: Why is a Security Protocol Correct? – 161

The Web as a Parallel Corpus – 243

STRATA

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

STRATEGY

Increasing Replayability with Deliberative and Reactive Planning – 156

STREPTOCOCCUS

The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity – 121

STRONTIUM

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 44

STRUCTURAL ANALYSIS

Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110

Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96

Structural Analysis and Bioengineering of Thermostable Pyrococcus Furiosus Prolydase for Optimization of Organophosphorus Nerve Agent Detoxification – 48

STRUCTURAL ENGINEERING

An Update on Structural Seal Development at NASA GRC – 28

QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 267

STRUCTURAL STABILITY

Phase Stability in Heavy f-Electron Metals from First-Principles Theory – 51

STRUCTURAL STRAIN

Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78

STRUCTURAL VIBRATION

Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – 268

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

STRUCTURAL WEIGHT

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 268

STUDENTS

Student Research Accomplishments, 2004-2005 – 98

Student Support: Spin Decoherence Measurements for Solid State Qubits – 233

SUBJECTS

The Analysis and Test of Phase Calibration – 260

SUBROUTINES

Advances in Mixed Signal Processing for Regional and Teleseismic Arrays – 191

SUBSIDENCE

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

SUBSTRATES

Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82

Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanosstructure Synthesis – 42

SULFONATES

Sulfonamide Cannabinoid Agonists and Antagonists – 37

SULFURIC ACID

Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 110

SUMS

Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 193

SUPERCONDUCTIVITY

Global Energy and Aviation Concerns – 6

SUPERLATTICES

Thermoreflectance Imaging of Superlattice Micro Refrigerators – 79

SUPERSONIC FLOW

Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – 4

SUPERSONIC JET FLOW

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

SUPERSONIC SPEED

Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91

SUPERSYMMETRY

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226

SUPPORT SYSTEMS

Group Coordination Support in Networked Multimedia Systems – 167

Maritime Planning Support System (MPSS) for Fleet Battle Experiment Juliet (FBE-J) – 158

SUPPORTS

Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 268

SURFACE DEFECTS

Metallic Seal Development for Advanced Docking/Berthing System – 52

SURFACE EMITTING LASERS

Photonic Crystal Light Emitting Diodes – 95

SURFACE FINISHING

Effect of Solventless Bore Cleaning Device (SBGD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40

Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216

SURFACE REACTIONS

Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48

SURFACE VEHICLES

Global Energy and Aviation Concerns – 6

SURFACES

Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration – 36

SURVEYS

A Survey of Spatio-Temporal Grouping Techniques – 175

SWEDEN

Purified Carboxymethylcellulose from Finland, Mexico, Netherlands, and Sweden. Investigation Nos. 731-TA-1084-1087 (Final) – 38

SWITCHES

Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 78

Research and Development of High-Capacity Optical Link Technologies – 218

Studies on Architecture and Control Technology for Optical Packet Switches – 218

SWITCHING

Advanced Lightpath Establishment for Distributed Computing – 221

Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements – 75

Routing in Packet-Switched Networks Using Path-Finding Algorithms – 188

SYMBOLS

Efficient Symbol-Spreading Strategies for Wireless Communication – 71

Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70

SYNCHRONISM

A Connectionist Treatment of Grammar for Generation: Relying on Emergents – 237

SYNCHROTRON RADIATION

CCLRC (Council for the Central Laboratory of the Research Councils) Annual Report and Accounts, 2005-2006 – 206

SYNCHROTRONS

Single Particle Beam Dynamics Design of BSNS/RCS – 205

SYNTAX

Knowledge Acquisition using an English-Based Method Editor – 177

SYNTHETIC APERTURE RADAR

C-20A Precision Autopilot Development – 10

SYNTHETIC APERTURES

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

SYSTEM EFFECTIVENESS

User Evaluation of Biospice – 141

SYSTEM IDENTIFICATION

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17

SYSTEMS ANALYSIS

Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16

Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

SYSTEMS ENGINEERING

Advanced Docking Berthing System Update – 28

Aerocapture Benefits to Future Science Missions – 246

Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21

Industrial and Systems Engineering Applications in NASA – 60

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

MCAO at Gemini – 250

Overview of NASA Glenn Seal Project – 29

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22

The Crossbow Air Launch Trade Space – 5

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

SYSTEMS HEALTH MONITORING

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 269

SYSTEMS INTEGRATION

Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 13

Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22

Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32

SYSTEMS MANAGEMENT

The DARPA/DMA Image Understanding Testbed SYSTEM MANAGER'S MANUAL. Version 2.0 – 239

SYSTEMS STABILITY

The Birth of Planetary Systems – 247

T TAURI STARS

Stellar Properties of Embedded Protostars: Progress and Prospects – 262

TAIWAN

Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 208

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – 53

TARGET ACQUISITION

Real-time Motion Tracking from a Mobile Robot – 185

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

TARGET RECOGNITION

Foundations of Automatic Target Recognition – 175

TARGETS

A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134

A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123

ASR-9 Refractivity Measurements Using Ground Targets – 112

TASKS

In-Space Crew-Collaborative Task Scheduling – 144

TEARING

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188

TECHNOLOGIES

Mapping of Technological Opportunities-Labyrinth Seal Example – 26

Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78

TECHNOLOGY ASSESSMENT

Technology Transition a Model for Infusion and Commercialization – 144

TECHNOLOGY UTILIZATION

Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225

Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 169

Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220

In-Space Propulsion Technology Program Solar Electric Propulsion Technologies – 33

Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218

Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220

Summary of Stirling Converter Testing at NASA Glenn Research Center – 88

Technology Transition a Model for Infusion and Commercialization – 143

The First Light Machine – 223

TELECOMMUNICATION

A General Probabilistic Model for Improving Key Assignment in Wireless Networks – 68

Distributed Assignment of Codes in Multihop Radio Networks – 71

Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67

Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution – 76

Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68

Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7

Telecommunications: FCC Needs to Improve Its Ability to Monitor and Determine the Extent of Competition in Dedicated Access Services – 66

TELESCOPES

Adaptive Optics: A Core Gemini Program – 251

Cepheids in Multiple Systems: ADS 14859 – 256

FLAMINGOS-2: A New MOS on the Block – 255

From Classical Adaptive Optics to MCAO – 251

Gemini Focus: Newsletter of the Gemini Observatory – 248

Gemini South Science Highlights – 254

Gemini's Adaptive Optics Program: An Overview – 250

Gemini's Laser Guide Star Facility – 248

Ground Layer AO (GLAO): A 'Third Gemini' – 254

History of U.S. Adaptive Optics Funding – 254

Hokupa'a: Gemini's First AO System – 249

Imaging Performance of the Si/Ge Hybrid Compton Imager – 222

IRS-8 : A Galactic Black Sheep – 252

Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223

NIFS at Gemini North – 255

On the Search for Transits of the Planets Orbiting Gliese 876 – 256

TELEVISION SYSTEMS

The Middle East Television Network: An Overview – 69

TEMPERATE REGIONS

Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

TEMPERATURE CONTROL

Advanced Thermal HPT Clearance Control – 15

TEMPERATURE DEPENDENCE

Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38

TEMPERATURE MEASUREMENT

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 87

Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59

TEMPERATURE PROFILES

Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229

TERRAIN

Domain Walls, Near-BPS Bubbles and Probabilitites in the Landscape – 226

Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99

Terrain Study of Hunter Liggett Military Reservation, Camp Reberts and Hearst Estate – 98

Terrain Study of Hunter Liggett Military Reservation, Camp Roberts and Hearst Estate – 98

TERRORISM

Militant Ideology Atlas: Research Compendium – 234

TEST FACILITIES

Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59

Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – 186

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58

TEST STANDS

Summary of Stirling Converter Testing at NASA Glenn Research Center – 88

TEXTBOOKS

Overview of Results of the MUC-6 Evaluation – 238

Overview of the Third Message Understanding Evaluation and Conference – 152

Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems – 144

Rhetoric as Knowledge – 238

TEXTS

Lightweight Structure in Text – 154

Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152

Machine Printed Text and Handwriting Identification in Noisy Document Images – 243

The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237

The Web as a Parallel Corpus – 243

TEXTURES

Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – 194

THAILAND

Polyethylene Terephthalate (PET) Resin from India, Indonesia, and Thailand. Investigations Nos. 701-TA-439 and 731-TA-1077, 1078 and 1080 (Final) – 56

Polyethylene Terephthalate (PET) Resin from India, Indonesia, Taiwan, and Thailand. Investigations Nos. 701-TA-439-440 and 731-TA-1077-1080 (Preliminary) – 53

THEMATIC MAPPING

Wind Resource Mapping for USA Off-shore Areas – 102

THERAPY

A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – 130

Novel Therapeutic Approach for Breast Cancer – 134

Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129

Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

Shape Memory Polymer Therapeutic Devices for Stroke – 54

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

THERMAL CONDUCTIVITY

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

Instabilities in NB(sup3)SN Wires – 229

THERMAL CONTROL COATINGS

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

THERMAL CYCLING TESTS

Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28

THERMAL EXPANSION

Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39

THERMAL MAPPING

Thermoreflectance Imaging of Superlattice Micro Refrigerators – 79

THERMAL PROTECTION

Aerocapture Benefits to Future Science Missions – 247

Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 86

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 269

Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13

THERMAL SIMULATION

Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 59

THERMAL STABILITY

Elastomeric Seal Development for Advanced Docking/Berthing System – 26

THERMAL STRESSES

Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31

THERMOACOUSTIC EFFECTS

Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 212

THERMODYNAMICS

Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 91

Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60

Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – 61

THERMOELECTRIC COOLING

Thermoelectric Power Factor for Electrically Conductive Polymers – 57

Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78

THERMOELECTRIC POWER GENERATION

Thermoelectric Power Factor for Electrically Conductive Polymers – 57

THERMOELECTRICITY

Thermoelectric Power Factor for Electrically Conductive Polymers – 57

THERMOREGULATION

Thermoregulatory Control Following Dynamic Exercise – 138

THERMOSTATS

Structural Analysis and Bioengineering of Thermostable *Pyrococcus Furiosus* Proxylidase for Optimization of Organophosphorus Nerve Agent Detoxification – 48

THIN FILMS

Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45

MBE Deposition of Epitaxial Fe_{1-x}V_x Films for Low-Loss GHz Devices; Atomic-Scale Engineering of Magnetic Dynamics – 83

Pinning Enhancement of YBa₂Cu₃O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94

Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103

Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13

THIN PLATES

Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62

Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97

THREE DIMENSIONAL COMPOSITES

MRS Workshop Explores the Diversity of 3D Multifunctional Ceramic Composites – 47

THROTTLING

Controlling a 757-200 Airplane with Throttles Only – 268

TIDES

Ocean Tide Models Performance in Coastal Regions – 116

TILT ROTOR AIRCRAFT

Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4

TIME SERIES ANALYSIS

Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 99

TITANIA

Preparation of Nanocomposites of Alumina and Titania – 54

TOLERANCES (MECHANICS)

Composites Damage Tolerance Workshop – 42

TOMOGRAPHY

Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction – 195

TOPOGRAPHY

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226

TOPOLOGY

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Channel Sharing of Competing Flows in Ad Hoc Networks – 165

Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166

Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149

TORSION

Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97

TOXICOLOGY

Certain 4,4'-Diamino-2, 2'-Stilbenedisulfonic Acid Chemistry from China, Germany, and India. Investigation Nos. 701-TA-435 and 731-TA-1036-1038 (Preliminary) – 37

TRACKING (POSITION)

Monitoring the News: A TDT Demonstration System – 234

TRACKING STATIONS

Satellite Laser Ranging Observations at the Shanghai Astronomical Observatory in 2005 – 260

TRADEOFFS

Actuator Trade-Off Analysis for DARPA/BOSS Prototype II – 83

TRAFFIC

Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166

Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183

Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet – 167

TRAJECTORIES

Another Analytical Approach to Predicting Munition Trajectories – 111

TRAJECTORY ANALYSIS

The Development of NASA's Low Thrust Trajectory Tool Set – 33

TRAJECTORY CONTROL

Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61

TRAJECTORY OPTIMIZATION

The Development of NASA's Low Thrust Trajectory Tool Set – 33

TRANSDUCERS

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96

Low Voltage Piezoelectric Composite for Transducer Applications – 85

The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

TRANSLATING

Comparing User-assisted and Automatic Query Translation – 244

Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153

How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 244

Parsing and Tagging of Bilingual Dictionary – 242

The Web as a Parallel Corpus – 243

TRANSMISSION ELECTRON MICROSCOPY

Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 117

TRANSMISSION LINES

Research and Development of High-Capacity Optical Link Technologies – 218

TRANSMITTERS

Miniature Low Frequency Acoustic Transmitter – 85

Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165

TRANSONIC FLOW

Computational Simulation of Semispan Wings in Wind Tunnels – 2

TRANSPORTATION

Wireline ITS Communications Training: Year 1 Report of Activities – 65

TRAPEZOIDS

Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62

TRIANGULATION

Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151

TRICHLOROETHYLENE

Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204

TROPOSPHERE

Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 112

TUMORS

Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130

Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129

Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 136

Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139

Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127

TUNABLE FILTERS

Compact Photonic Gateway with AOTF for Remotely Controlling λ -Paths – 222

TURBINE BLADES

Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency – 13

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15

TURBINE ENGINES

Overview of NASA Glenn Seal Project – 29

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15

TURBINES

Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25

Turbine Aerothermal Research – 15

Ultra High Work, High Efficiency Turbines For UAVs – 12

TURBOFAN ENGINES

Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 15

TURBOMACHINERY

2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24

Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3

TURBULENCE MODELS

Computational Simulation of Semispan Wings in Wind Tunnels – 2

TURBULENCE

Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114

Turbulent Chemical Interaction Models in NCC: Comparison – 88

Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265

TURBULENT FLOW

Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111

TYROSINE

The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141

UKRAINE

Magnesium from China and Russia. Investigation Nos. 731-TA-1071-1072 (Preliminary) – 50

ULTRASONICS

Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122

Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – 139

ULTRAVIOLET RADIATION

Optical Coatings and Surfaces in Space: MISSE – 218

UNCERTAIN SYSTEMS

Delay-Dependent H(sub infinity) Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach – 63

UNDERWATER ACOUSTICS

Active Control of Blade Tonals in Underwater Vehicles – 214

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80

UNDERWATER COMMUNICATION

Identifying Error in AUV Communication – 70

UNDERWATER VEHICLES

A Flexible Cymbal Array – 86

Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80

Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

Active Control of Blade Tonals in Underwater Vehicles – 213

Allocating AUVs for Mine Map Development in MCM – 101

Identifying Error in AUV Communication – 70

Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213

Regulating a Formation of a Large Number of Vehicles – 173

Support Platform and Communications to Manage Cooperative AUV Operations – 68

UNITED STATES

Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Psychodidae:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120

Wind Resource Mapping for USA Offshore Areas – 102

UNIVERSE

The First Light Machine – 223

UNIVERSITIES

Display Research at the University of Southern California – 82

EXPORT CONTROLS: Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Universities – 64

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 2, April 2006 – 2

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 4, August 2006 – 1

Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 5, October 2006 – 1

UPPER STAGE ROCKET ENGINES

In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

URANIUM 238

Non-Scaling FFAG for Rare Isotopes Production – 210

URINALYSIS

Prostate Cancer Detection by Molecular Urinalysis – 136

USER REQUIREMENTS

Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242

User Evaluation of Biospice – 141

VACCINES

Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135

VACUUM

Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226

- Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51
- VAPOR DEPOSITION**
Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
- VARIABLE STARS**
Cepheids in Multiple Systems: ADS 14859 – 256
- VARIATIONS**
Delay-Dependent $H(\infty)$ Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach – 63
Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
- VECTOR SPACES**
Robustness of Path-Vector Protocols Without Independent Route Ranking – 199
- VEGETATION**
Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247
- VELOCITY DISTRIBUTION**
Supercontinuum Generation and its Applications – 77
- VERY LONG BASE INTERFEROMETRY**
Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 258
Software Realization Method of Extracting VLBI Phase Calibration Signal – 259
- VIBRATION TESTS**
QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268
- VIBRATION**
Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74
- VIDEO COMPRESSION**
Compressed Video Segmentation – 171
- VIRTUAL REALITY**
Branching Storylines in Virtual Reality Environments for Leadership Development – 155
Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155
Evaluation of Multi-Party Reality Dialogue Interaction – 155
Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems – 92
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- VIRUSES**
A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – 130
Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140
Human Immunodeficiency Virus Type 1 (HIV-1) Viral Protein R (Vpr)-Mediated Cell Cycle Arrest: An Analysis of Current Mechanistic Models – 121
Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120
- VISCOELASTICITY**
A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 58
Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57
- VOICE COMMUNICATION**
Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
- VOID RATIO**
Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222
- VOLATILE ORGANIC COMPOUNDS**
Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 40
Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40
- VOLUMETRIC ANALYSIS**
Volumetric Data Analysis Using Morse-Smale Complexes – 149
- VORTEX SHEDDING**
Mast Wake Reduction by Shaping – 90
- VORTICES**
Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4
Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62
- VULNERABILITY**
Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Companies – 240
EXPORT CONTROLS: Agencies Should Assess Vulnerabilities and Improve Guidance for Protecting Export-Controlled Information at Universities – 64
- WAFERS**
An Update on Structural Seal Development at NASA GRC – 28
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- WAKES**
Mast Wake Reduction by Shaping – 90
- WAR GAMES**
Increasing Replayability with Deliberative and Reactive Planning – 156
- WARFARE**
Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240
Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140
- WASTE MANAGEMENT**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- WATER**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- WAVE DISPERSION**
Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110
- WAVE PROPAGATION**
Numerical Study of X-Ray Diffraction Effects within Objects – 231
- WAVE SCATTERING**
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 267
- WAVEGUIDES**
High Frequency via With Stripped Semi-Rigid Cable – 203
- WAVELENGTH DIVISION MULTIPLEXING**
Advanced Lightpath Establishment for Distributed Computing – 221
Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
- WAVELET ANALYSIS**
Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67
Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194
Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
Robust Wavelet Thresholding for Noise Suppression – 212

- Using Natural Wavelet Bases and Multi-scale Stochastic Models for Tomographic Reconstruction – 195
- WEIGHTING FUNCTIONS**
 An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181
 Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182
- WELLS**
 Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55
- WETLANDS**
 A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 101
- WHEAT**
 Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247
- WIDE AREA NETWORKS**
 Advanced Lightpath Establishment for Distributed Computing – 221
- WIND TUNNEL MODELS**
 Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications – 4
- WIND TUNNEL TESTS**
 A Comparison of Two Balance Calibration Model Building Methods – 189
 Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91
- WIND TUNNELS**
 Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 91
 Computational Simulation of Semispan Wings in Wind Tunnels – 2
- WIND VELOCITY**
 Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- WINDPOWER UTILIZATION**
 Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – 102
 Wind Resource Mapping for USA Off-shore Areas – 102
- WIRELESS COMMUNICATION**
 A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164
- Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries – 161
- Channel Sharing of Competing Flows in Ad Hoc Networks – 165
- COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188
- Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163
- Differential Space-Time Modulation for Wideband Wireless Networks – 168
- Dynamics of a Loop-Free Path-Finding Algorithm – 163
- Efficient Symbol-Spreading Strategies for Wireless Communication – 70
- Iterated Local Optimization for Minimum Energy Broadcast – 185
- Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165
- Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162
- SeRLoc: Robust Localization for Wireless Sensor Networks – 162
- WIRE**
 Instabilities in NB(sup3)SN Wires – 229
- WOOD**
 Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41
- WORDS (LANGUAGE)**
 Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198
 Mapping WorldNet Senses to a Lexical Database of Verbs – 237
 Militant Ideology Atlas: Executive Report – 234
- WORKLOADS (PSYCHOPHYSIOLOGY)**
 Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 6
- WORLD WIDE WEB**
 Lunar e-Library: Putting Space History to Work – 262
- WORMS**
 Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – 125
- X RAY DIFFRACTION**
 Development of a Rapid Decontamination System for the Nerve Agents – 49
 Numerical Study of X-Ray Diffraction Effects within Objects – 231
 Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- X RAY IMAGERY**
 Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
- X RAY LASERS**
 Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230
 FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- X RAY OPTICS**
 Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230
 Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216
- X RAYS**
 Canadian Led X-ray Polarimeter Mission CXP – 262
 Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
 Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
 Generation and Characterization of Attosecond Pulses – 208
 Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
 Mirror Technology Roadmap – 216
- YBCO SUPERCONDUCTORS**
 Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- YEAST**
 A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134
- YOUTH**
 Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66
 Online Victimization: A Report on the Nation's Youth – 147
 Online Victimization of Youth: Five Years Later – 147
- ZEOLITES**
 Development of a Rapid Decontamination System for the Nerve Agents – 49

Personal Author Index

- Abbott, Nicholas L**
New Tools for Measurement of Personal Exposure to Chemical Environments – 46
- Abbott, R. P.**
Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225
- Abedin, Kazi Sarwar**
Optical Signal Processing using Fiber Nonlinearity – 221
- Abeles, J. H.**
Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Aceves, Alejandro**
Modeling Complex Nonlinear Optical Systems – 225
- Achari, Aniruddha**
Fluorescence Approaches to Growing Macromolecule Crystals – 35
- Adamovich, I.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Adams, Charles L.**
Mercury Sample Return using Solar Sails – 264
- Adams, J. H., Jr.**
Radiation Dose from Lunar Neutron Albedo – 263
- Adams, Swann A**
Quasi-Pro prospective Study of Breast Cancer and Diet – 137
- Adcock, P. A.**
Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- Adibi, Jafar**
The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245
- Aglitskii, Y.**
High Energy Electron Transport in Solids – 206
- Agrawal, Govind, P.**
Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216
- Agvaanluvsan, U.**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
Soft Radiative Strength in Warm Nuclei – 215
- Ahmed, F.**
Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Ahn, Sang--Sik**
An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 60
- Ahrens, L.**
Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208
- Akahane, Kouichi**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Akiba, Makoto**
Status of Development of Photon Number Resolving Detectors – 76
- Akli, K. U.**
High Energy Electron Transport in Solids – 206
- Akli, K.**
Overview of Recent Progress in US Fast Ignition Research – 226
- Aldrin, John C**
Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10
- Alessin, J.**
Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208
- Algin, E.**
Soft Radiative Strength in Warm Nuclei – 215
- Allan, James**
Cross-Document Coreference on a Large Scale Corpus – 190
Monitoring the News: A TDT Demonstration System – 234
- Allwine, Daniel A**
Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10
- Alpizar-Vicente, A.**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
- Altshuler, Dmitry A**
Computational Prediction of Kinetic Rate Constants – 47
- Alves-Foss, Jim**
Architecture-Based Refinements for Secure Computer Systems Design – 164
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- Ambrose, A.**
Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55
- Amidon, Charles P**
Three-Dimensional Display Assembly – 86
- Amiranoff, F.**
High Energy Electron Transport in Solids – 206
- An, Yan**
Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258
- Anast, Peter**
Global Energy and Aviation Concerns – 6
- Andersen, C.**
High Energy Electron Transport in Solids – 206
- Anderson, Michael J**
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213
- Andersson, J.**
Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44
Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45
- Andrews, Anthony**
Nuclear Fuel Reprocessing: U.S. Policy Development – 215
- Anghelescu, Andrei**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Annaswamy, Anuradha M**
Active Control of Blade Tonals in Underwater Vehicles – 213
- Anthony, Robert M**
Characterization and Function of the Inflammatory Response to Infection by a Gastrointestinal Nematode Parasite: New Insights into Protective Th2 Responses – 125
- Anthony, Theodore**
Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- Aoyama Tomonori**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Appelt, Douglas**
A Practical Nonmonotonic Theory for Reasoning About Speech Acts – 169
- Arai, Nahoko**
A Study for Technology of Controlling Next-Generation Backbone Network – 219

- Arnaiz, Alfredo**
MUC-4 Test Results and Analysis – 238
- Artis, Gwen**
Aerocapture Benefits to Future Science Missions – 246
The Development of NASA's Low Thrust Trajectory Tool Set – 33
- Ashiabor, Senanu**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Astrom, S.**
Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses – 109
- Athans, Michael**
An Interim Report of Research on Stochastic and Adaptive Systems – 191
- Atwood, C.**
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- Auslender, Aaron H.**
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31
- Av-Ron, Evyatar**
User Evaluation of Biospice – 141
- Awschalom, D. D.**
WTEC Panel Report on Spin Electronics – 75
- Bagherjeiran, A.**
Graph-Based Methods for Orbit Classification – 148
- Bahou, Wadie**
Molecular Basis of Essential Thrombocytosis – 133
- Bai, M.**
Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208
- Bai, Yingxin**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Baik, Hojong**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Bailey, Timothy A**
Pervasive Computing (PvC) ... and Its Impact on Next Generation Army Systems – 157
- Bailey, William**
MBE Deposition of Epitaxial Fe1-xVx Films for Low-Loss Ghz Devices; Atomic-Scale Engineering of Magnetic Dynamics – 83
- Baily, Fred**
Brush Seals for Improved Steam Turbine Performance – 24
- Baker, Bradley N**
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213
- Baker, G. L.**
Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72
- Baker, Mark**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Balakrishnan, Ramesh**
A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157
- Balasubramaniyan, Saravanan**
A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157
- Balcells Capellades, Marti**
An Appearance Based Approach for Human and Object Tracking – 187
- Bamieh, Bassam**
On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – 179
Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems – 178
The Nyquist Stability Criterion for a Class of Spatially Periodic Systems – 178
- Banaszuk, Andrzej**
Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211
- Banks, Bruce A.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28
- Banks, H T**
A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 57
- Bansal, Narottam P.**
Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39
- Barnard, J. J.**
US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202
- Barnes, P. D.**
Innovative Fission Measurements with a Time Projection Chamber – 215
- Barnes, Paul N**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
Pinning Enhancement of YBa2Cu2O7-d Thin Films with Y2BaCuO5 Nanoparticles – 94
- Barrett, Sean E**
Spin Decoherence Measurements for Solid State Qubits – 214
Student Support: Spin Decoherence Measurements for Solid State Qubits – 233
- Barrios, C. A.**
Optically Controlled Photonic Switch – 217
- Barrows, Danny A.**
Videogrammetric Model Deformation Measurement Technique for Wind Tunnel Applications – 4
- Barrozo, Christopher P**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Barth, Timothy J.**
Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151
- Bartram, Scott M.**
Phase Calibration of Microphones by Measurement in the Free-field – 211
- Barty, A.**
Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- Baseman, D. L.**
Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Basseville, Michele**
Modeling and Estimation of Multiresolution Stochastic Processes – 193
- Batholomew, B.**
Modulation System for Communication – 65
- Bauer, Guenther**
Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32
- Baumann, Ethan**
C-20A Precision Autopilot Development – 9
- Baumgardner, Darrel**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Bauschlicher, Charles W., Jr.**
Application of Density Functional Theory to Systems Containing Metal Atoms – 50
- Bayer, Samuel**
Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
- Baylor, Robert**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Beal, Carole**
An Image Schema Language – 172

- Beale, David**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Beaman, J. J.**
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- Bean, Thomas A**
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213
- Bearinger, J. P.**
Shape Memory Polymer Therapeutic Devices for Stroke – 54
- Beasley, D B**
Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command – 81
Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82
Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 224
- Beauchamp, Charles H**
Mast Wake Reduction by Shaping – 89
- Bebout, Brad M.**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Beck, Tracy**
NIFS at Gemini North – 255
- Becker, J. A.**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
- Becker, J.**
Soft Radiative Strength in Warm Nuclei – 215
- Becvar, F.**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
- Beg, F.**
Overview of Recent Progress in US Fast Ignition Research – 226
- Bekker, Dmitriy**
Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78
- Belcher, Angela**
Reversible Nanoparticle Electronics – 210
- Belhaj, M.**
Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses – 109
- Belvin, Robert S**
MUC-3 Test Results and Analysis – 144
MUC-4 Test Results and Analysis – 238
- Bender, Matt**
Design of a Large Pupil Relief Broadband Collimator for use in a MMW/IR HWIL Facility – 224
- Bennett, W. J.**
Shape Memory Polymer Therapeutic Devices for Stroke – 54
- Benjamin, Kim C**
A Flexible Cymbal Array – 86
Low Voltage Piezoelectric Composite for Transducer Applications – 85
- Bennett, Craig B**
A Functional Genomics Approach to Identify Novel Breast Cancer Gene Targets in Yeast – 134
- Bennett, John G**
A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants – 160
- Benson, S. E.**
Super-Resolution Algorithms for Nondestructive Evaluation Imaging – 204
- Benveniste, Albert**
Modeling and Estimation of Multiresolution Stochastic Processes – 193
- Berg, L. L.**
Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Berger, Lauren A.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- Bergman, T. L.**
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- Bergmann, Marcel**
FLAMINGOS-2: A New MOS on the Block – 255
- Bergstrom, Robert W.**
Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
- Berner, P. T.**
Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
- Bernhard, Jennifer T**
Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- Bernoldt, D. E.**
Multiple Walkers in the Wang-Landau Algorithm – 150
- Betti, R.**
Overview of Recent Progress in US Fast Ignition Research – 226
- Beyer, Richard A**
Ablation Loss Studies for Capillary - Sustained Plasmas – 228
- Bhatia, M**
Using Natural Wavelet Bases and Multi-scale Stochastic Models for Tomographic Reconstruction – 195
- Bhattacharya, M.**
Radiation Dose from Lunar Neutron Albedo – 263
- Biazar, Arastoo**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 111
- Bibeau, C.**
April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217
- Bibeau, T. A.**
Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation – 40
- Biederman, Irving**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Bieniosek, F. M.**
New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227
US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202
- Biggs, J**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Bissell, Mina J**
Undergraduate Training in Mammary Gland Biology and Breast Cancer – 133
- Biswas, R.**
WTEC Panel Report on High-End Computing Research and Development in Japan – 150
- Blankson, Isiah M.**
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31
- Blaskiewicz, M.**
Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208
- Blue, C. A.**
Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35
- Blue, Ryan**
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- Bluem, H. P.**
System and Method for Producing Terahertz Radiation – 201

- Blythe, Jim**
Knowledge Acquisition using an English-Based Method Editor – 177
On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT – 176
- Bogacz, S. A.**
Recirculating Linac Muon Accelerator for Mentrino Factory – 205
- Boglarski, Stephen L**
Application of Hydrogen Bond Acidic Polycarbosilane Polymers and Solid-Phase Microextraction for the Collection of Nerve Agent Simulant – 56
- Bolas, Mark**
Display Research at the University of Southern California – 82
- Bonometti, Joseph A.**
Boom Rendezvous Alternative Docking Approach – 31
The Crossbow Air Launch Trade Space – 5
- Borelli, Kathy J**
Parallelization of a Blind Deconvolution Algorithm (Postprint) – 184
- Borg, Stephen E.**
Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91
- Borges, Rafael**
An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181
- Boros, Endre**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Borucki, W. J.**
The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247
- Bottin, Jr, Robert R**
Monitoring Completed Navigation Projects, Lessons Learned IV – 115
- Bourell, D.**
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- Bowers, Albion**
2005 Engineering Annual Report – 267
- Bowers, John E**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Bowsher, Aaron**
Brush Seals for Improved Steam Turbine Performance – 24
- Boyd, R. W.**
Generation and Characterization of Attosecond Pulses – 208
- Boyd, Robert W**
Polarized Single-Photons on Demand - A New Source for Quantum Information – 215
- Brachman, Jarret**
Militant Ideology Atlas: Executive Report – 234
Militant Ideology Atlas: Research Compendium – 234
- Bragg-Sitton, Shannon M.**
Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58
- Brandhorst, Henry W., Jr.**
Impact of Solar Array Designs on High Voltage Operations – 30
- Braselton, Bill**
Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82
- Braun, A. M.**
Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Braun, Minel**
Numerical Simulations and an Experimental Investigation of a Finger Seal – 28
- Braun, Paul V**
MRS Workshop Explores the Diversity of 3D Multifunctional Ceramic Composites – 47
- Bredeweg, T. A.**
Investigation of the Statistical Properties of Stable Eu Nuclei Using Neutron-Capture Reactions – 203
- Breitenkamp, K.**
Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly – 36
- Brennan, John K**
Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation – 186
- Brenner, Marty**
Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 17
Hilbert-Huang Transform-Based Stability Spectral Analysis – 10
Multi-Input Multi-Output Flight Data Analysis with HHT – 16
- Brewer, Keith M**
The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11
- Bridges, James**
Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles – 15
- Briggs, R. J.**
US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202
- Brobst, Paul**
Increasing Replayability with Deliberative and Reactive Planning – 156
- Brooks, V.**
Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 98
- Brothers, L. E.**
Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55
- Broughton, Roy M., Jr.**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Brown, C. A.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Brown, C. G.**
Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 223
- Brown, Clifford A.**
Acoustic Efficiency of Azimuthal Modes in Jet Noise Using Chevron Nozzles – 15
- Brown, D. A.**
Proposal for a High Energy Nuclear Database – 209
- Brown, G.**
Multiple Walkers in the Wang-Landau Algorithm – 150
- Brown, K.**
Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209
- Brunke, Lyle B**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Brydia, R. E.**
Wireline ITS Communications Training: Year 1 Report of Activities – 65
- Bryk, Darryl**
Multiband Imagery for Concealed Weapon Detection – 92
- Bubenheim, David L.**
Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247
- Budil, K.**
FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- Buford, Jim**
Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82

- Buhrman, R. A.**
WTEC Panel Report on Spin Electronics – 75
- Bullo, Francesco**
Monitoring Environmental Boundaries with a Robotic Sensor Network – 185
Notes on Averaging Over Acyclic Digraphs and Discrete Coverage Control – 200
- Bulut, M**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 71
- Bundy, Mark**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Bunzow, J. R.**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- Burks, M.**
Imaging Performance of the Si/Ge Hybrid Compton Imager – 222
- Burnett, Mark**
Brush Seals for Improved Steam Turbine Performance – 24
- Burnham, A. K.**
Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44
- Burrenll, K. H.**
Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Byberg, Alicia**
Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223
- Byers, Dave**
Focus and Objectives For Effecting Near-Term Investments To Bipropellant Earth Storable Propulsion Systems – 34
- Byrne, John H**
User Evaluation of Biospice – 141
- Byun, Daewon**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 111
- Cadarette, Bruce S**
Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143
- Cai, Fan**
Research on the Sampling Offset about Satellite Navigation Receiver – 258
- Callahan, D. A.**
Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225
- Campbell, Charles H.**
Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- Campbell, Katherine M**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Campbell, Timothy A**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Campo, Angie**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Cant, Tony**
Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158
- Carin, Lawrence**
Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212
- Carlborn, K.**
Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41
- Carley, Kathleen M**
A Typology for C2 Measures – 68
DyNetML: Interchange Format for Rich Social Network Data – 246
- Carpenter, Jay**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Carpenter, Paul**
Branching Storylines in Virtual Reality Environments for Leadership Development – 155
Increasing Replayability with Deliberative and Reactive Planning – 156
- Carpick, Robert W**
Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – 48
- Carrington, Connie K.**
Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 169
- Carter, B**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Carter, Emily A**
Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – 46
First Principles and Multiscale Modeling of Spallation and Erosion of Gun Tubes – 49
- Carter, R**
Thermoregulatory Control Following Dynamic Exercise – 138
- Casper, T. A.**
Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Castellani, J W**
Prevention of Cold Injuries During Exercise – 142
- Castellani, John W**
Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142
- Catipovic, Josko**
Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80
- Celeste, J. R.**
Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
- Cemansky, N P**
The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89
- Ceresol, A.**
Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226
- Chaban, Galina M.**
Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142
- Chai, B. H.**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- Chalupsky, Hans**
The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245
- Chan, David Y**
Prostate Cancer Detection by Molecular Urinalysis – 136
- Chan, Heang-Ping**
Digital Mammography: Development of an Advanced Computer-Aided Diagnosis System for Breast Cancer Detection – 126
- Chan, W. K.**
Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Chang, Chang-Tang**
Biofiltration of Hydrogen Sulfide-Containing Waste Gas by Entrapped Mixed Microbial Cells – 64
- Chang, Jeng-Shian**
Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 63
- Chang, L W**
Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68

- Chang, LiWu**
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
- Chang, Y C**
Fundamental Research on Infrared Detection – 93
- Chang, Yu-Han**
An Image Schema Language – 172
- Chang, Yun-Ming**
Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62
- Chapman, H. N.**
Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- Chapman, Jane**
Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
- Chari, C. V. K.**
General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208
- Chaudhury, P. K.**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50
- Chavey, Lucas J**
An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94
- Cheffes, Anthony**
Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77
- Chen, Caihua**
Photonic Band Gap Devices for Commercial Applications – 232
- Chen, Chia-Chong**
A Hybrid SVM and Supervised Learning Approach to Fuzzy Min-Max Hyperbox Classifiers – 63
An Efficient Genetic Algorithm for TSK-type Neural Fuzzy Identifier Design – 148
- Chen, Hong-Chung**
Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 63
- Chen, Jeng-Der**
Robust Mixed H2/H(sub infinity) Controller for Uncertain Neutral State-Input Delayed Systems via LMI optimization Approach – 148
- Chen, L. J.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Chen, Li**
Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257
Membership and Spatial Motion of Young Open Cluster NGC 2244 – 259
- Chen, S.**
Overview of Recent Progress in US Fast Ignition Research – 226
- Chen, Wenqin**
Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183
- Chen, Yau-Ming**
Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62
- Chen, Zhigang**
Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – 161
- Cheng, K Y**
Fundamental Research on Infrared Detection – 93
- Cherepy, N.**
Remote Sensing of Alpha and Beta Sources Modeling Summary – 43
- Cherukuri, B.**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50
- Chin, Hui N**
Carving Differential Unit Test Cases from System Test Cases – 154
- Chirgwin, John M**
Tumor-Secreted Autocrine Motility Factor (AMF): Causal Role in an Animal – 127
- Chivers, D.**
Imaging Performance of the Si/Ge Hybrid Compton Imager – 222
- Cho, J. Y. N.**
ASR-9 Refractivity Measurements Using Ground Targets – 112
- Cho, Min-gyu**
Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – 161
- Choo, C. C.**
Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110
- Choquette, Kent D**
Photonic Crystal Light Emitting Diodes – 95
- CHou, Hsi-Tseng**
Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66
- Chou, K C**
Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194
Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data – 187
- Chou, Kenneth C**
Modeling and Estimation of Multiresolution Stochastic Processes – 193
- Chou, P. J.**
Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207
- Chou, R. M.**
Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235
- Christofferson, James**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Chuang, S L**
Fundamental Research on Infrared Detection – 93
- Chubb, K. K.**
Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235
- Chun, Mark**
Science from NIFS System Verification – 252
- Chupp, Ray**
Brush Seals for Improved Steam Turbine Performance – 24
- Cieri, Christopher**
Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152
- Clare, Susan E**
Operative Therapy and the Growth of Breast Cancer Micrometastases: Cause and Effect – 129
- Clark, G. A.**
Super-Resolution Algorithms for Non-destructive Evaluation Imaging – 204
- Clarke, Dana W., Sr.**
Mapping of Technological Opportunities-Labyrinth Seal Example – 25
- Close, Laini M.**
Very Low-mass Binaries – 253
- Clough, Jonathan C**
Configurable Aerospace Command and Control (CACC) – 65
- Clouse, Katherine N**
EGFR Activation by Spatially Restricted Ligands – 131
- Coble, Jeffrey A**
Structure Discovery in Sequentially Connected Data – 241

- Coburn, William**
Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- Cohen, Paul R**
An Image Schema Language – 172
- Cohen, R. H.**
Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227
- Cohen, Robert E**
Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57
- Cokkinides, V.**
Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Cole, Daniel R.**
Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91
- Cole, Jennifer H.**
Controlling a 757-200 Airplane with Throttles Only – 268
- Coleman, Joseph**
Identifying Error in AUV Communication – 70
- Collins, Michael**
Semantic Tagging using a Probabilistic Context Free Grammar – 191
- Colwell, F. S.**
Coupling of Realistic Rate Estimates with Genomics for Assessing Contaminant Attenuation and Long-Term Plume Containment – 204
- Condon, Robert**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Contreras-Sesvold, Carmen**
Reactive Astrocytes: Phenotypic and Functional Characteristics and Astrocytes as Neural Stem Cells – 124
- Cook, Diane J**
Structure Discovery in Sequentially Connected Data – 241
- Cook, Jerry R.**
NASA Ares 1 Crew Launch Vehicle Upper Stage Configuration Selection Process – 20
- Cook, Lawrence P**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Cooper, Gene R**
Another Analytical Approach to Predicting Munition Trajectories – 111
- Cork, C.**
Imaging Performance of the Si/Ge Hybrid Compton Imager – 222
- Cortes, Jorge**
Notes on Averaging Over Acyclic Diagrams and Discrete Coverage Control – 200
- Costa, Bruno**
An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181
Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199
Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199
- Cousins, A. M.**
Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44
- Covo, M. K.**
New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227
- Cox, G. N.**
Cysteine Variants of Erythropoietin – 204
- Crile, Jim**
A System for Collecting Data on Observer Preferences in the Field Using Personal Data Assistants – 160
- Critchley, I. L.**
Dual Mode Power Unit Having a Compressor Bypass System – 14
- Croke, Edward T**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Crosson, William**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99
- Cruciani, Everlyn**
2005 Engineering Annual Report – 267
- Crudgington, Peter**
Brush Seals for Improved Steam Turbine Performance – 24
- Crum, Nancy F**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Crump, P. A.**
Semiconductor Lasers with Hybrid Materials Systems – 217
- Cuff, T R**
Support Platform and Communications to Manage Cooperative AUV Operations – 68
- Cui, C.**
Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- Cumming, A.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Cung, Garvin**
Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- Cunningham, M.**
Imaging Performance of the Si/Ge Hybrid Compton Imager – 222
- Cupolo, J.**
Status of Fast IR Orbit Feedback at RHIC – 207
- Curran, H. J.**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
- Curreri, Peter A.**
Processing of Space Resources to Enable the Vision for Space Exploration – 263
- Cuzzi, J. N.**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- Daggett, Dave**
Global Energy and Aviation Concerns – 6
- Dahlgren, S.**
Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
- Dall'Agata, G.**
Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226
- Daniels, Chris**
An Update on Structural Seal Development at NASA GRC – 28
- Daniels, Christopher C.**
Overview of NASA Glenn Seal Project – 29
- Daniels, Christopher**
Elastomeric Seal Development for Advanced Docking/Berthing System – 26
Metallic Seal Development for Advanced Docking/Berthing System – 52
- Dankanich, John W.**
In-Space Propulsion Technology Program Solar Electric Propulsion Technologies – 33
- Dapino, Marcelo J**
Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 95
Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96
- Darwish, Kareem**
Probabilistic Structured Query Methods – 245

- Das, Rajat**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70
- Das, R**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 71
- Dasgupta, Nilanjan**
Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212
- Dash, Sanford M**
Evaluation of Some Recent Jet Noise Reduction Concepts – 11
- Daso, Endwell O.**
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31
- Dateo, Christopher E.**
Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142
- Datta, Amit**
High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – 27
- Dauffy, L. S.**
Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
- Daughton, J. M.**
WTEC Panel Report on Spin Electronics – 75
- David, Philip**
Shaped-Based Recognition of 3D Objects From 2D Projections – 175
- Davidson, R. C.**
US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202
- Davis, Elizabeth**
In-Space Crew-Collaborative Task Scheduling – 144
- Davis, P.**
Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225
- Davis, Stephan R.**
NASA Crew Launch Vehicle Flight Test Process – 30
- Day, D. E.**
Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228
- de Almelda, V. R.**
Optically Controlled Photonic Switch – 217
- DeCastro, Jonathan**
Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14
- Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- deGroh, Kim, K.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- DeHaan, Mark A.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Delgado, Irebert**
Overview of NASA Glenn Seal Project – 29
- DeLoach, Richard**
A Comparison of Two Balance Calibration Model Building Methods – 189
- Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- DeLoach, Richard**
Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18
- DeMange, Jeff**
An Update on Structural Seal Development at NASA GRC – 28
- Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
- Overview of NASA Glenn Seal Project – 29
- DeMenthon, Daniel**
A Survey of Spatio-Temporal Grouping Techniques – 175
- Shaped-Based Recognition of 3D Objects From 2D Projections – 175
- Deng, Xiaomin**
Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188
- Derenne, S. T.**
TOXECON(Trade Name) Retrofit for Mercury and Multi-pollutant Control on three 90-MW Coal-Fired Boilers. (Quarterly Report, January 1, 2006-March 31, 2006) – 104
- Desrayaud, Ch**
Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53
- DeVito, M. A.**
Semiconductor Lasers with Hybrid Materials Systems – 217
- Dewald, D. L.**
Radiation-Driven Hydrodynamics of Long Pulse Hohlräume on the National Ignition Facility – 227
- Dewang, L.**
Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 4, August 2006 – 1
- Journal of Nanjing University of Aeronautics & Astronautics, Volume 38, Number 5, October 2006 – 1
- Dickens, James**
Compact, Portable Pulsed-Power – 201
- Dickens, Ricky E.**
Thermal Simulator Development: Non-Nuclear Testing of Space Fission Systems – 58
- Dickes, Edward G**
Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3
- Dignon, J.**
Remote Sensing of Alpha and Beta Sources Modeling Summary – 43
- Dimitrova, S. S.**
Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206
- Dimotakis, Paul**
Reducing DoD Fossil-Fuel Dependence – 101
- DiSante, Peter G**
Hybrid Drive Partnerships Keep the Army on the Right Road – 59
- Divol, L.**
Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225
- Dobek, Lou**
High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29
- Dobrovolskis, A.**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- Doermann, David**
Compressed Video Segmentation – 171
- Machine Printed Text and Handwriting Identification in Noisy Document Images – 243
- Parsing and Tagging of Bilingual Dictionary – 242
- Dokulil, Jonathan**
Carving Differential Unit Test Cases from System Test Cases – 154
- Dollyhigh, Samuel**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Dommel, Hans-Peter**
Group Coordination Support in Networked Multimedia Systems – 167
- Dommel, H-P**
Multisites Coordination in Shared Multicast Trees – 164

- Don, Wai S**
An Improved Weighted Essentially Non-Oscillatory Scheme for Hyperbolic Conservation Laws – 181
Multi-Domain Hybrid Spectral-WENO Methods for Hyperbolic Conservation Laws – 199
Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199
- Dong, Dingeng**
Numerical Simulations and an Experimental Investigation of a Finger Seal – 28
- Dongarra, J.**
WTEC Panel Report on High-End Computing Research and Development in Japan – 150
- Donohue, Casey**
A Brief Summary of the 2005 Pathfinder+ Aeroelastic/Turbulence Flight Tests – 9
- Doran, Christine**
Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
- dOrgeville, Celine**
Gemini's Laser Guide Star Facility – 248
- Dorr, Bonnie J**
Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244
Mapping WorldNet Senses to a Lexical Database of Verbs – 237
Symbolic MT With Statistical NLP Components – 169
- Dorr, Bonnie**
Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198
Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153
- Doty, Kevin**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 111
- Dowla, F.**
Token Ring Protocol for Dynamic Ad-hoc Wireless Environments – 148
- Doyle, E. J.**
Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Du, Julie**
Structural Analysis and Bioengineering of Thermostable *Pyrococcus Furiosus* Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification – 48
- Ducharme, M B**
Prevention of Cold Injuries During Exercise – 142
- Dudney, N. J.**
Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35
- Dukelsky, J.**
Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206
- Dumbacher, Daniel L.**
A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 22
- Dumbacher, Daniel**
Building Operations Efficiencies into NASA's Ares I Crew Launch Vehicle Design – 21
- Dunham, E. W.**
The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247
- Dunlap, Pat**
An Update on Structural Seal Development at NASA GRC – 28
Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
- Dunlap, Patrick, Jr.**
Metallic Seal Development for Advanced Docking/Berthing System – 52
- Dunlap, Patrick**
Elastomeric Seal Development for Advanced Docking/Berthing System – 26
Overview of NASA Glenn Seal Project – 29
- Dunn, J.**
FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- Dupuis, Paul**
Dynamic Importance Sampling for Queueing Networks – 192
Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181
Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 192
Refined Large Deviation Asymptotics for the Classical Occupancy Problem – 182
Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Convergence Analysis – 197
Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Examples and Numerics – 181
- Dupuis, R D**
Fundamental Research on Infrared Detection – 93
- D'Urso, B. R.**
Composite, Nanostructured, Super-Hydrophobic Material – 41
Composite, Ordered Material Having Sharp Surface Features – 41
- Dutton, S.**
Development of BPM Electronics at the JLAB FEL – 232
- Dwyer, Matthew B**
Carving Differential Unit Test Cases from System Test Cases – 154
Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186
Parallel Randomized State-Space Search – 174
- Ebbers, C. A.**
Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 223
- Eder, E. F.**
Graphical Representation of Temporal Data from Simulations – 150
- Edwards, Dean B**
Identifying Error in AUV Communication – 70
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213
Regulating a Formation of a Large Number of Vehicles – 173
- Edwards, Dean**
Allocating AUVs for Mine Map Development in MCM – 101
- Eisenhower, Bryan**
Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211
- Ekheden, Y.**
Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45
- Elbaum, Sebastian**
Carving Differential Unit Test Cases from System Test Cases – 154
Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186
Parallel Randomized State-Space Search – 174
- Elliott, Daniel S**
Neutral Atom Lithography With Multi-Frequency Laser Fields – 47
- Elliott, D.**
Wind Resource Mapping for USA Off-shore Areas – 102
- Elsner, R.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Elwasif, W. R.**
Multiple Walkers in the Wang-Landau Algorithm – 150

- Emmons, Louisa**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – [111](#)
- Emrick, T. S.**
Amphiphilic Polymer Capsules and Related Methods of Interfacial Assembly – [36](#)
- Eng, Ron**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – [59](#)
- Engelhaupt, Darell**
Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – [216](#)
- Ercoline, William R**
Flare Cue Symbology for Zero-Zero Weather Landings – [5](#)
- Eriksson, Mark A**
Conveyor Belt Transport; the Role of Friction and Mass in the Separation of Arbitrary Collections of Microparticles – [48](#)
- Erwin, R S**
Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PRE-PRINT) – [173](#)
- Eskelund, G**
Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – [40](#)
- Estes, Maurice G., Jr.**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – [99](#)
- Evans, David A**
Conversation as Planned Behavior – [170](#)
- Evans, Julianna M**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – [45](#)
- Evans, Nancy R**
Cepheids in Multiple Systems: ADS 14859 – [256](#)
- Evans, Phillip G**
Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – [95](#)
- Evans, Phillip**
Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – [96](#)
- Evans, Steven W.**
A One-Piece Lunar Regolith-Bag Garage Prototype – [264](#)
- Evtushenko, P.**
Development of BPM Electronics at the JLAB FEL – [232](#)
- Fabrega, F J**
Strand Spaces: Why is a Security Protocol Correct? – [161](#)
- Fabris, L.**
Imaging Performance of the Si/Ge Hybrid Compton Imager – [222](#)
Report on the Performance of a Large-Area, Gamma-Ray Imager for Search – [214](#)
- Falzarano, Thomas G**
Air Force Organizational Adoption of Remotely Piloted Vehicles – [11](#)
- Fan, Xiaofeng**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – [78](#)
- Fang, S. X.**
Single Particle Beam Dynamics Design of BSNS/RCS – [205](#)
- Fang, S.**
China Spallation Neutron Source Accelerators: Design, Research, and Development – [207](#)
- Fardad, Makan**
On Stability and the Spectrum Determined Growth Condition for Spatially Periodic Systems – [179](#)
Perturbation Methods in Stability and Norm Analysis of Spatially Periodic Systems – [178](#)
The Nyquist Stability Criterion for a Class of Spatially Periodic Systems – [178](#)
- Farmer, J. N.**
Semiconductor Lasers with Hybrid Materials Systems – [217](#)
- Fasel, Hermann F**
Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – [3](#)
- Feigenbaum, Joan**
Incentive-Compatible Interdomain Routing – [160](#)
Learning-Based Anomaly Detection in BGP Updates – [159](#)
- Feldman, Laurie**
The Significance of Erythropoietin Receptor (EpoR) Acquisition by Breast Cancer Cells – [128](#)
- Felter, Joseph**
Militant Ideology Atlas: Executive Report – [234](#)
Militant Ideology Atlas: Research Compendium – [234](#)
- Ferguson, Dale**
Impact of Solar Array Designs on High Voltage Operations – [30](#)
- Ferrrrrgenson, D. P.**
Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – [108](#)
- Ferry, G. V.**
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kTSSs? – [109](#)
- Fidock, Justin**
Organisational Structure and Information Technology (IT): Exploring the Implications of IT for Future Military Structures – [239](#)
- Figueroa, Manuel A**
An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – [94](#)
- Fikes, John C.**
In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – [58](#)
In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – [59](#)
- Filippelli, Lawrence**
Maritime Planning Support System (MPSS) for Fleet Battle Experiment Juliet (FBE-J) – [158](#)
- Finckenor, Miria M.**
Optical Coatings and Surfaces in Space: MISSE – [217](#)
- Finckenor, Miria**
Lunar e-Library: Putting Space History to Work – [262](#)
- Fine, Jason M**
Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems – [100](#)
- Fine, M. E.**
Alloy Design of Nanoscale Precipitation Strengthened Alloys: Design of a Heat Treatable Aluminum Alloy Useful to 400 Degrees Celsius. Final Report – [52](#)
- Finkbeiner, Josh**
An Update on Structural Seal Development at NASA GRC – [28](#)
Overview of NASA Glenn Seal Project – [29](#)
- Finkbeiner, Joshua**
Investigations of Shuttle Main Landing Gear Door Environmental Seals – [27](#)
- Finkelhor, D.**
Internet Sex Crimes Against Minors: The Response of Law Enforcement – [66](#)
Online Victimization: A Report on the Nation's Youth – [147](#)
Online Victimization of Youth: Five Years Later – [147](#)
- Finley, P. D.**
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – [108](#)
- Fischer, W.**
RHIC Operational Status and Upgrade Plans – [210](#)
- Fisher, R. A.**
Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements – [75](#)

- Fisher, Scott**
Gemini Focus: Newsletter of the Gemini Observatory – 248
Gemini South Science Highlights – 254
- Fishman, G. J.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Flatte, Michael E**
Spin Coherence in Semiconductor Nanostructures – 233
- Fletcher, Douglas G.**
Arcjet Flow Properties Determined from Laser-Induced Fluorescence of Atomic Species – 86
Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 90
- Florin, David A**
Morphometric and Molecular Analyses of the Sand Fly Species *Lutzomyia shannoni* (Dyar 1929) (Diptera:Phlebotominae) Collected from Seven Different Geographical Areas in the Southeastern USA – 120
- Flynn, Kevin C.**
Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 12
- Folwell, N.**
High Performance Computing in Accelerating Structure Design and Analysis – 229
- Forget, N.**
Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 223
- Forsyth, T.**
Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – 102
- Forsythe, Elizabeth**
Fluorescence Approaches to Growing Macromolecule Crystals – 35
- Foti, Thomas**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 100
- Fox, J.**
Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
- Fralick, Gustave C.**
Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13
- Francis, Chris**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Frank, M.**
Distinguishing Seven Species of *Bacillus* Spores Using BioAerosol Mass Spectrometry – 108
Remote Sensing of Alpha and Beta Sources Modeling Summary – 43
- Franz, Otto**
Cepheids in Multiple Systems: ADS 14859 – 256
- Freeman, R. R.**
Overview of Recent Progress in US Fast Ignition Research – 226
- Freitag, Lee**
Acoustic Communication With Small UAVs Using a Hull-Mounted Conformal Array – 80
- French, Guy A**
Flare Cue Symbology for Zero-Zero Weather Landings – 5
Flight Display Integration – 17
- Frey, David**
Monitoring the News: A TDT Demonstration System – 234
- Friedl, Karl E**
Field Studies of Exercise and Food Deprivation – 143
- Friedman, A.**
Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – 227
- Frogel, Jay A.**
History of U.S. Adaptive Optics Funding – 254
- FROM**
The Gemini Planet Imager – 255
- Frost, C.**
Dual Mode Power Unit Having a Combustor Bypass System – 14
- Froula, D. H.**
Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225
- Fu, S.**
China Spallation Neutron Source Accelerators: Design, Research, and Development – 207
- Fujiwara, Mikio**
Status of Development of Photon Number Resolving Detectors – 76
- Fukuchi, Kiyoshi**
Research and Development of High-Capacity Optical Link Technologies – 218
- Fultz, George**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Fung, J**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Furman, M. A.**
Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
- Fuss, T.**
Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228
- Gabbay, Robert**
Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122
- Gagea,Leonard**
Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32
- Galbreath, Nathan W**
The Effect of Feedback on Penile Tumescence in Sexually Functional Men – 118
- Gallagher, D. L.**
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266
- Galstyan, Aram**
Analysis of Dynamic Task Allocation in Multi-Robot Systems – 193
- Gamayunov, K. V.**
Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266
- Ganni, V.**
Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207
- Gao, Allen C**
The Role of Stat3 Activation in Androgen Receptor Signaling and Prostate Cancer – 128
- Gao, Chunkai**
Notes on Averaging Over Acyclic Digraphs and Discrete Coverage Control – 200
- Gao, Jianyun**
Membership and Spatial Motion of Young Open Cluster NGC 2244 – 259
- Garces, Rodrigo**
Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163
- Garcia, Gerald**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40

- Garcia-Luna-Aceves, J J**
 A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164
 A Scalable and Fault-Tolerant Architecture for Internet Multicasting Using Meshes – 157
 Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166
 Channel Sharing of Competing Flows in Ad Hoc Networks – 165
 Collision Avoidance and Resolution Multiple Access: First-Success Protocols – 163
 Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165
 Directional Collision Avoidance in Ad Hoc Networks – 85
 Dynamics of a Loop-Free Path-Finding Algorithm – 163
 Efficient Routing in Packet-Radio Networks Using Link-State Information – 67
 Multisites Coordination in Shared Multicast Trees – 164
 Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165
 Policy-Aware Connectionless Routing – 166
 Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166
- Gard, E. E.**
 Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – 108
- Gardner, C.**
 Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209
- Gardner, Sheldon**
 Maritime Planning Support System (MPSS) for Fleet Battle Experiment Juliet (FBE-J) – 158
- Garg, Saurabh**
 Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
 Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70
- Garner, James**
 Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Garragan, G**
 Low Temperature Thermal Desorption Processes for the Remediation of Soils Contaminated with Solvents, Hydrocarbons, and Petroleum Products – 40
- Garvin, Lotisha E**
 Investigation of the Basis for Persistent Porin Serotypes of Neisseria Gonorrhoeae in Community Infections – 125
- Gasterland, Terry**
 Constraints on the Generation of Tense, Aspect, and Connecting Words from Temporal Expressions – 198
- Ge, L.**
 High Performance Computing in Accelerating Structure Design and Analysis – 229
- Geballe, Thomas R.**
 IRS-8 : A Galactic Black Sheep – 252
- Geil, Bruce**
 Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103
- Geisheimer, Jon**
 Microwave Blade Tip Clearance System: An Update – 34
- George, Bryan**
 Dialogue Interaction with the DARPA Communicator Infrastructure: The Development of Useful Software – 154
- Getty, David J**
 An Evaluation of Stereoscopic Digital Mammography for Earlier Detection of Breast Cancer and Reduced Rate of Recall – 126
- Ghoch, R. N.**
 Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72
- Ghosh, Somnath**
 Multi-Scale Dynamic Computational Models for Damage and Failure of Heterogeneous Materials – 42
- Giampapa, Joeph**
 An Examination of Remote Access Help Desk Cases – 160
- Giesbrecht, G G**
 Prevention of Cold Injuries During Exercise – 142
- Gil, Yolanda**
 On the Role of Humans in Enterprise Control Systems: the Experience of IN-SPECT – 176
- Gillani, Noor**
 Exploring the Production of NOx by Lightning and Its Impact on Tropospheric Ozone – 111
- Gingras, David R**
 Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3
- Ginn, Starr**
 Sixty-Thousand-Pound Capacity Starr Soft Support (60K3S) – 267
- Girard, S**
 Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53
- Giryavets, A.**
 Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226
- Glass, James**
 The MIT Summit Speech Recognition System: A Progress Report – 195
- Glenn, J.**
 Status of Fast IR Orbit Feedback at RHIC – 207
- Glickman, E**
 Prevention of Cold Injuries During Exercise – 142
- Glynn, James**
 Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80
- Goedecke, George H**
 Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
- Gohil, P.**
 Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Gokcen, Tahir**
 Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 90
- Golden, S A**
 Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194
- Golden, Stuart A**
 Modeling and Estimation of Multiresolution Stochastic Processes – 193
- Goodman, S. J.**
 Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113
- Goodrich, Jennifer S**
 EGFR Activation by Spatially Restricted Ligands – 131
- Goodwin, T. J.**
 Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- Gooi, Chung H**
 Cross-Document Coreference on a Large Scale Corpus – 190
- Goorjian, Peter M.**
 Maxwell-Bloch Equations Modeling of Ultrashort Optical Pulse Propagation in Semiconductor Materials – 216
- Goran, Daniel**
 Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Gordon, Andrew**
 Branching Storylines in Virtual Reality Environments for Leadership Development – 155

- Gorti, S.**
Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51
- Gottlieb, David**
Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199
- Gottlieb, L**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Gozu, Shin-ichiro**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Grandy, D. K.**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- Gratadour, Damien**
From Classical Adaptive Optics to MCAO – 251
MCAO at Gemini – 250
- Gratch, J**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Greeley, J. S.**
High Frequency via With Stripped Semi-Rigid Cable – 202
High Frequency Via – 74
- Green, Rebecca**
Mapping WorldNet Senses to a Lexical Database of Verbs – 237
- Green, Stefan J.**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Greene, Thomas**
Stellar Properties of Embedded Protostars: Progress and Prospects – 262
- Gregg, Wayne**
Composites Damage Tolerance Workshop – 42
- Gregory, Don**
Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- Griffith, R. O.**
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108
- Grills, Ardath W**
The Complexity of Plasmodium Falciparum Infections in Children in Western Kenya – 126
- Grober, Robert**
Reducing DoD Fossil-Fuel Dependence – 101
- Grondahl, Clayton**
Pressure Actuated Leaf Seals for Improved Turbine Shaft Sealing – 25
- Grosso, J.**
Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – 105
- Grosz, Barbara J**
Utterance and Objective: Issues in Natural Language Communication – 171
- Grund, Mathew**
Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80
- Grunden, Amy M**
Structural Analysis and Bioengineering of Thermostable Pyrococcus Furiosus Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification – 48
- Gschwender, Lois J**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Gubarev, Mikhail**
Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216
- Guerguiev, V. G.**
Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206
- Guetz, A.**
High Performance Computing in Accelerating Structure Design and Analysis – 229
- Gundersen, Marin A**
Compact, Portable Pulsed-Power – 201
- Guo, Peng**
GPS Radio Occultation Data Processing System – 258
- Gupta, Rahul**
Monitoring the News: A TDT Demonstration System – 234
- Gutman, Joshua D**
Strand Spaces: Why is a Security Protocol Correct? – 161
- Guyon, Olivier**
AO Imaging of Quasar Host Galaxies – 252
- Gwaltney, David A.**
Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32
- Gyulaasy, A.**
Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
- Haas, Michael**
A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146
- Habash, Nizar Y**
Symbolic MT With Statistical NLP Components – 169
- Habash, Nizar**
Handling Translation Divergences: Combining Statistical and Symbolic Techniques in Generation-Heavy Machine Translation – 153
- Haddad, Timothy S**
Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57
- Hagen, Gregory**
Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211
- Haight, Harlan**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Haji, Aïm**
Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Postprint) – 173
- Hakkani-Tuer, D**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Hall, D. R.**
Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
Modulation System for Communication – 65
- Hall, Robert M.**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Hall, T.**
Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
- Hallberg, Jackie P**
Parameter Estimation Tools for Hydrologic and Hydraulic Simulations – 196
- Haller, G**
Reduced Navier-Stokes Equations Near a Flow Boundary – 88
- Hamann, B.**
Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
- Hammer, J. H.**
Bent Marshak Waves – 261
- Hamory, Philip J.**
Progress with Reconfigurable Instrumentation Signal Conditioning Development – 78
- Han, Ling**
Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 259
- Han, Q.**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50

- Hanke, Andreas**
Regulation of DNA Metabolism by DNA-Binding Proteins Probed by Single Molecule Spectroscopy – 137
- Hanley, W. G.**
Hierarchical Bayesian Approach to Locating Seismic Events – 190
- Hanna, D.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Hansen, P M**
Safety Core Insulator Failures Reliability Analysis – 79
- Hanson, Andrew J**
The DARPA/DMA Image Understanding Testbed SYSTEM MANAGER'S MANUAL. Version 2.0 – 239
- Harai, Hiroaki**
Studies on Architecture and Control Technology for Optical Packet Switches – 218
- Hardee, P.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Harik, I. E.**
Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110
Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96
Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97
- Haron, Steven**
Progress Report on Advanced Detection and Classification Algorithms for Acoustic-Color-Based Sonar Systems – 212
- Harper, D. C.**
Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35
- Harrelson, Larry G**
Selected Well Data Used in Determining Ground-Water Availability in the North and South Carolina Atlantic Coastal Plain Aquifer Systems – 100
- Harrer, Ann**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Harrison, B C**
Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94
- Harrison, C. D.**
Graphical Representation of Temporal Data from Simulations – 150
- Harrison, Neal A.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Hart, M. E.**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- Hartmann, D. H.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Hasegawa, Toshio**
Secure Communication with Quantum Cryptography – 76
- Hashiguchi, Tomohiro**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Hatakeyama, Ichiro**
Research and Development of High-Capacity Optical Link Technologies – 218
- Haugan, Timothy J**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
Pinning Enhancement of YBa₂Cu₂O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94
- Hau-Riege, S.**
Adsorbed XFEL Dose in the Components of the LCLS X-Ray Optics – 230
- Hayano, H.**
Performance of a Nanometer Resolution BPM System – 231
- Hayasaka, Kazuhiro**
Quantum Network Consisting of Laser-cooled Ions and Photons – 77
- Haynes, Davy A.**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Haynes, Kip**
Display Research at the University of Southern California – 82
- Hayward, Tom**
Searching for Planets with NIC1 – 253
- Hazard, C. R.**
Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements – 75
- Hazi, A.**
Power of Partnership – 146
- He, Daqing**
Comparing User-assisted and Automatic Query Translation – 243
TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245
- Hebert, James R**
Quasi-Prospective Study of Breast Cancer and Diet – 137
- Heberton, C I**
Three-Dimensional Finite-Volume EL-LAM Implementation – 184
- Heffner, M. D.**
Innovative Fission Measurements with a Time Projection Chamber – 215
- Heisele, Bernd**
Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170
- Hendricks, Robert C.**
2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24
Global Energy and Aviation Concerns – 6
- Henley, Mark W.**
In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59
- Henley, Mark**
In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58
- Henry, G W**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Herren, Ken**
Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- Herrera, Claudia**
Build-Up Approach to Determine the Connection Stiffness for the F-15B/QuietSpike(TradeMark) Interface – 268
- Hershfield, Jeremy R**
The Molecular Basis of Canavan Disease: Aspartoacylase Enzyme Characteristics – 124
- Herzog, Jonathan C**
Strand Spaces: Why is a Security Protocol Correct? – 161
- Hespanha, Joao P**
Moment Closure for the Stochastic Logistic Model – 190
- Hesthaven, J S\g**
Reduced Navier-Stokes Equations Near a Flow Boundary – 88
- Heyl, J.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Heymsfield, Andrew J.**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Hill, D. W.**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- Hill, Jr , Randall W**
Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155
- Hill, R**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Hinze, Nicholas**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7

- Hirsh, Susan B**
MUC-4 Test Results and Analysis – 238
- Hlavka, C. A.**
Statistical Modeling of Landscape Pattern and the Effects of Coarse Spatial Resolution – 99
- Ho, C. K.**
Finite Element Analyses of Continuous Filament Ties for Masonry Applications: Final Report for the Arquin Corporation – 40
- Ho, Mingtsu**
Scattering of Electromagnetic Pulse from a Moving and Vibrating Perfect Plane using Characteristic Based Algorithm – 74
- Hoang, T. M.**
Sense Amplifier for Static Random Access Memories – 73
- Hobbs, Jerry R**
Conversation as Planned Behavior – 170

Metaphor, Metaphor Schemata, and Selective Inferencing – 170
- Hock, Vincent F**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Hogan, R.**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- Hogue, William**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Holbrook, Rob**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 100
- Holder, J.**
Radiation-Driven Hydrodynamics of Long Pulse Hohlräume on the National Ignition Facility – 227
- Holder, Lawrence B**
Structure Discovery in Sequentially Connected Data – 241
- Hollister, S.**
WTEC Panel Report on Additive/Subtractive Manufacturing Research and Development in Europe – 38
- Holloway, Gary**
Rotating Intershaft Brush Seal Project – 26
- Holtz, Kristi**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Holzhauser, Douglas**
Cognitive Network Computer for Atmospheric Monitoring – 115
- Honda, Y.**
Performance of a Nanometer Resolution BPM System – 231
- Hong, Xiaoyu**
The Scientific Research and Technical Work of Shanghai Astronomical Observatory in 2005 – 257
- Hood, J B**
A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 57
- Hooke, W. M.**
Interpretation of Diamagnetic Signals – 205
- Hoover, Richard B.**
Comets, Asteroids, Meteorites, and the Origin of the Biosphere – 262
- Hopper, Darrel G**
Flight Display Integration – 17
- Horn, J. M.**
Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – 108
- Hornberger, G Z**
Three-Dimensional Finite-Volume EL-LAM Implementation – 184
- Hout, Joseph J**
Identification of the Compounds Formed During the Low Temperature Heat Dispersal of o-Chlorobenzylidene Malononitrile (CS Riot Control Agent) – 45
- Hovater, Mary A.**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Howard, Rick**
Requirements and Techniques for Developing and Measuring Simulant Materials – 266
- Howard, S. D.**
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSSs? – 109
- Howard, Steve**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Howarth, Thomas R**
Acoustic Projectors for AUV and UUV Applications in Shallow Water Regions – 213

Broadband Acoustic Projector for Low-Frequency Synthetic Aperture Sonar Application – 81

Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80
- Howe, H. L.**
Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Howell, Joe T.**
In-Space Cryogenic Propellant Depot (ISCPD) Architecture Definitions and Systems Studies – 58

In-Space Cryogenic Propellant Depot Potential Commercial and Exploration Applications – 59
- Howells, M. R.**
Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- Howsman, Tom**
Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – 19
- Hoyt, Reed W**
Field Studies of Exercise and Food Deprivation – 143
- Hseuh, H.**
Overview of the SNS Accelerator Mechanical Engineering – 205
- Hsiao, T. Y.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Hsiao, Yu-Ting**
Implementation of Physical Optics Analysis of Spiral Antenna radiations in the Presence of BOR random Structure for the Application of Direction Finding. – 66
- Hsieh, K C**
Fundamental Research on Infrared Detection – 93
- Hsu, Chien-Hsiang**
Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62
- Hsu, S. Y.**
Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207
- Hu, Chien-Feng**
Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61
- Hu, J. D.**
Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97
- Hu, K. H.**
Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207
- Hu, Xiaogong**
Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 256
- Huang, Chien-Hsin**
Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74

- Huang, Chi-Hung**
Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62
- Huang, Hesu**
Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79
- Huang, Jin H.**
Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74
- Huang, Z.**
Semiconductor Lasers with Hybrid Materials Systems – 217
- Hudson, Larry**
Fiber Optic Sensor Attachment Development and Performance Evaluations – 224
- Huebner, Lawrence D.**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Hughes, Chanita**
Genetic Counseling for Breast Cancer Susceptibility in African American Women – 138
- Hughes, Steven A**
CHL Precision Flow Table - Description and Applications – 177
- Hultbert, Randy S**
Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3
- Humblet, Pierre A**
Design of Optical Matched Filters – 92
- Humphreys, William M.**
Phase Calibration of Microphones by Measurement in the Free-field – 211
- Hunter, Gary W.**
Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13
- Huo, Winifred M.**
Electron-Impact Ionization and Dissociative Ionization of Biomolecules – 142
- Hurricane, O. A.**
Bent Marshak Waves – 261
- Husaini, Yasmin**
Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
- Hwaley-Fedder, R.**
System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222
- Imaizumi, Hideaki**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Ingrassia, P.**
Analysis of Availability and Reliability in RHIC Operations – 209
- Inutsuka, S.**
Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261
- Irwin, Daniel E.**
SERVIR's Contributions and Benefits to Belize thru Spatial Data Infrastructure (SDI) Development – 100
- Ise, Dayna S.**
RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32
- Ishizuka, Hirokazu**
Secure Communication with Quantum Cryptography – 76
- Ito, Toshiharu**
Research and Development of High-Capacity Optical Link Technologies – 218
- Ivanov, V.**
High Performance Computing in Accelerating Structure Design and Analysis – 229
- Izutsu, Masayuki**
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Jaap, John**
In-Space Crew-Collaborative Task Scheduling – 144
- Jackson, J. A.**
Super-Resolution Algorithms for Non-destructive Evaluation Imaging – 204
- Jackson, R. H.**
System and Method for Producing Terahertz Radiation – 201
- Jacobs, G B**
Reduced Navier-Stokes Equations Near a Flow Boundary – 88
- Jaggard, Aaron D**
Robustness of Path-Vector Protocols Without Independent Route Ranking – 198
- Jaggi, Seema**
Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
- Jakovljevic, Mirko**
Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – 32
- James, Bonnie**
Aerocapture Benefits to Future Science Missions – 246
- Janes, David B**
Neutral Atom Lithography With Multi-Frequency Laser Fields – 47
- Jasinski, J.**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- Jaszkwowiak, Paul**
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- Jenkins, B K**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Jenkins, J. M.**
The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247
- Jenney, Tim**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Jensen, Joseph**
Searching for Planets with NICI – 253
- Jhala, Arnab**
Branching Storylines in Virtual Reality Environments for Leadership Development – 155
- Jiang, D E**
Effects of Alloying on the Chemistry of CO and H₂S on Fe Surfaces – 46
- Jimenez, Dinice L**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Jindra, Nichole M**
An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94
- Johannesson, G.**
Hierarchical Bayesian Approach to Locating Seismic Events – 190
- Johnson, Aaron**
A Model of Onion Routing With Provable Anonymity – 167
- Johnson, Hoyt**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99
- Johnson, Les**
Recent Advances in Solar Sail Propulsion at NASA – 33
- Johnson, Rachel**
Gemini Focus: Newsletter of the Gemini Observatory – 248
- Johnson, W L**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Jones, Carl R**
Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240

- Jones, Chris**
Analysis of Dynamic Task Allocation in Multi-Robot Systems – 193
- Jordan, K.**
Development of BPM Electronics at the JLAB FEL – 232
- Jorgensen, Inger**
Studying High-z Galaxies with MCAO – 254
- Joshi, Aravind K**
Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145
- Journey, W S**
Thermoregulatory Control Following Dynamic Exercise – 138
- Jovanovic, I.**
Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 223
- Jung, Boyoon**
Real-time Motion Tracking from a Mobile Robot – 185
- Kaduchak, G.**
Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- Kai, Yutaka**
Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222
- Kaj, L.**
Results from the Swedish National Screening 2005. Subreport 2. Biotics – 44
Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45
- Kallos, R.**
Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226
- Kamath, C.**
Graph-Based Methods for Orbit Classification – 148
- Kamijoh, Takeshi**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Kamio, Yukiyoishi**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Kang, Intae**
COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188
Iterated Local Optimization for Minimum Energy Broadcast – 185
- Kannepalli, C**
Evaluation of Some Recent Jet Noise Reduction Concepts – 11
- Kano, Shinya**
Experiments of a Terabit-Class Super-Network – 220
- Kantor, Paul**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Karungo, Tapas**
The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualizing Toolkit – 237
- Kapitula, Todd**
Modeling Complex Nonlinear Optical Systems – 225
- Karagol-Ayan, Burcu**
Parsing and Tagging of Bilingual Dictionary – 242
- Karl, W C**
Foundations of Automatic Target Recognition – 175
Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction – 195
- Karniadakis, George E**
A Discontinuous Galerkin Method for Two-Temperature Plasmas – 228
An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – 199
Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – 183
- Karovska, Margarita**
Cepheids in Multiple Systems: ADS 14859 – 256
- Karttunen, Lauri**
Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172
- Kartuzov, Valeriy V**
Mechanical, Mathematical, and Computer Modeling in Penetration Mechanics - IV (Hybrid Models for Nanostructured Ceramics - II) – 56
- Karwatka, Mike**
Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – 186
- Karwowski, Waldemar**
A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146
- Kasimatis, K.**
Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37
- Kaspi, V.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Kastner, J.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Katti, R. R.**
Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Kauffman, R. L.**
Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
- Kaushik, Sangeeta**
Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medical Recommendations – 145
- Kavaya, Michael J.**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Kawanishi, Tetsuya**
Advanced Optical Modulators for Next-generation Photonic Networks – 219
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Kearney, D.**
Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004 – 102
- Keating, Edward G**
Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10
- Keeney, James T**
Multiple Usage of Existing Satellite Sensors (PREPRINT) – 23
Multiple Usage of Existing Satellite Sensors – 23
- Kegley, Jeffrey**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Kell, Joseph W**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Keller, Matthias**
Quantum Network Consisting of Laser-cooled Ions and Photons – 77
- Keller, Steven**
Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- Kelly, B.**
Parabolic Trough Solar System Piping Model. Final Report for May 13, 2002 to December 31, 2004 – 102
- Kenefick, Robert W**
Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142
- Kenny, G P**
Thermoregulatory Control Following Dynamic Exercise – 138
- Kenzakowski, D C**
Evaluation of Some Recent Jet Noise Reduction Concepts – 11

- Kerby, Kiersten C**
Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- Khait, K.**
Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37
- Khammash, Mustafa**
Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – 118
- Khan, Maudood**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99
- Khandelwal, Vikas**
Monitoring the News: A TDT Demonstration System – 234
- Khatri, Aparajita**
Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
- Khazanov, G. V.**
Effect of Ring Current Ions on Electromagnetic Ion Cyclotron Wave Dispersion Relation – 110
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266
- Kidd, Luanne**
The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 20
- Kilic, M S**
Reduced Navier-Stokes Equations Near a Flow Boundary – 88
- Killinc-Balci, Fatma**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Kim, Jae G**
Monitoring of Breast Tumor Response to Local Chemotherapeutic Agent Delivered by Biodegradable Fibers – 136
- Kim, J.-H.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Kim, Jihie**
Memory-Based Meta-Level Reasoning for Interactive Knowledge Capture – 242
- Kim, Youngjun**
Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155
- Kingery, B. J.**
Dual Mode Power Unit Having a Compressor Bypass System – 14
- Kissner, Lea**
Privacy-Preserving Distributed Information Sharing – 241
- Kitagawa, Akira**
Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77
- Kitayama, Ken-ichi**
Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219
- Kitayama, Kenichi**
R&D Activities of Photonic Networks in the World – 221
- Klay, J. L.**
Innovative Fission Measurements with a Time Projection Chamber – 215
- Klein, R. I.**
Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261
- Kleinschmidt, Justin**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Klimas, Charles V**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 100
- Kloc, Stefan J**
Unmanned Combat Air Vehicle (UCAV) Automated Refueling Simulation Development. Delivery Order 0009: Volume 2 - KC-135 – 3
- Knight, Thomas F**
Cellular Gate Technology – 116
- Knopp, Jeremy S**
Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10
- Knudson, P.**
Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207
- Kobayashi, Shuko**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Kobayashi, Takahisa**
Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14
- Kobla, Vikrant**
Compressed Video Segmentation – 171
- Koch, D. G.**
The Kepler Mission: A Mission to Determine the Frequency of Inner Planets Near the Habitable Zone of a Wide Range of Stars – 247
- Koch, Grady J.**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Koch, J. A.**
Charge Carrier Density and Signal Induced in a CVD Diamond Detector from NIF DT Neutrons, x-rays, and Electrons – 230
- Kodama, Takeshi**
Experiments of a Terabit-Class Super-Network – 220
- Kohlhepp, V.**
Token Ring Protocol for Dynamic Ad-hoc Wireless Environments – 148
- Koide, S.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Konikow, L F**
Three-Dimensional Finite-Volume EL-LAM Implementation – 184
- Konolige, Kurt**
A Deduction Model of Belief and Its Logics – 172
A Practical Nonmonotonic Theory for Reasoning About Speech Acts – 169
Belief and Incompleteness – 196
Hierarchic Autoepistemic Theories for Nonmonotonic Reasoning: Preliminary Report – 168
- Konstantinou, A. V.**
Methods and Systems for Autonomously Managing a Network – 149
- Kopesky, Edward T**
Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57
- Kos, Larry**
The Development of NASA's Low Thrust Trajectory Tool Set – 33
- Koshak, William**
Exploring the Production of NOx by Lightning and Its Impact on Tropospheric Ozone – 111
- Kosovic, B.**
Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114
- Kostyk, Christopher**
Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 269
- Kozyra, J. U.**
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266

- Krackhardt, David**
A Typology for C2 Measures – 68
- Kramer, W. T.**
NERSC Sustained System Performance (SSP) Metric – 147
- Krausman, Andrea s**
Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146
- Krawiecki, Stephen**
Rotating Intershaft Brush Seal Project – 26
- Krim, Hamid**
Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67
Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
- Krim, H**
Robust Wavelet Thresholding for Noise Suppression – 212
- Kubota, Fumito**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Kufe, Donald W**
Fusions of Breast Carcinoma and Dendritic Cells as a Vaccine for the Treatment of Metastatic Breast Cancer – 135
- Kukreja, Sunil**
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 17
Nonlinear Black-Box Modeling of Aeroelastic Systems Using a Structure Detection Approach – 16
- Kulkarni, S R**
Some Discrete Approximations to a Variational Method for Image Segmentation – 187
- Kulkarni, Sandeep S**
Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries – 161
- Kuo, C. H.**
Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207
- Kurata, Kazuhiko**
Research and Development of High-Capacity Optical Link Technologies – 218
- Kuri, Toshiaki**
Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
- Kurihara, Noriyuki**
Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Kushner, Harold J**
Numerical Approximations for Non-Zero-Sum Stochastic Differential Games – 179
Numerical Approximations for Stochastic Systems With Delays in the State and Control – 180
Scheduling and Control of Mobile Communications Networks with Randomly Time Varying Channels by Stability Methods – 192
Scheduling and Control of Multi-Node Mobile Communications Systems With Randomly-Varying Channels by Stability Methods – 196
- Kutsuzawa, Satoko**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Kwakernaak, M. H.**
Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Kwon, O.**
General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208
- Kynard, Michael H.**
RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32
- Kyriakakis, C**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Kyriakakis, Chris**
Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments – 184
Real-valued Delayless Subband Affine Projection Algorithm for Acoustic Echo Cancellation – 79
- LaBore, Catherine**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70
- LaBore, C**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 71
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Labounty, Chris**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- LaCasse, K.**
Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113
- Landen, O. L.**
Radiation-Driven Hydrodynamics of Long Pulse Hohlraums on the National Ignition Facility – 227
- Lane, Kimberly**
Multiband Imagery for Concealed Weapon Detection – 92
- Lange, Birgit**
Quantum Network Consisting of Laser-cooled Ions and Photons – 77
- Lange, Wolfgang**
Quantum Network Consisting of Laser-cooled Ions and Photons – 77
- Langston, Henry**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 100
- Lara-Curzio, Edgar**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97
- Larsen, Curtis E.**
Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- Lasnier, C. J.**
Density and Temperature Profile Modifications with Electron Cyclotron Power Injection in Quiescent Double Barrier Discharges on DIII-D – 229
- Latham, William P**
Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint) – 95
- Latkowski, J. F.**
Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225
- Lau, Yun-Fai C**
Mitochondrial Structure and Reactive Oxygen Species in Mammary Oncogenesis – 129
- Lavrenko, Victor**
Monitoring the News: A TDT Demonstration System – 234
- Lawson, D. C.**
Sense Amplifier for Static Random Access Memories – 73
- Lazos, L**
Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68
- Lazos, Loukas**
Coverage in Heterogeneous Sensor Networks – 197
HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80
Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162
SeRLoc: Robust Localization for Wireless Sensor Networks – 162
- Le Blanc, C.**
Double-Passed, High-Energy Quasi-Phase-Matched Optical Parametric Chirped-Pulse Amplifier – 223
- Le Coze, J**
Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53

- Leach, M. J.**
Final Report for the Joint Urban 2003 Atmospheric Dispersion Study in Oklahoma City: Lawrence Livermore National Laboratory Participation – 105
- Learned, Rachel E**
Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67
- Lebedev, V. A.**
Recirculating Linac Muon Accelerator for Metrino Factory – 205
- Lebovitz, A.**
Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37
- Leder, Kevin**
Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 192
- Lee, Chang Ha**
The Architecture of TrueViz: A Groundtruth/Metadata Editing and Visualization Toolkit – 237
- Lee, D.**
Commissioning of the Digital Transverse Bunch-by-Bunch Feedback System for the TLS – 207
- Lee, Insup**
Advanced Tool Integration for Embedded System Assurances – 157
- Lee, James**
C-20A Precision Autopilot Development – 9
- Lee, Jintae**
How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 244
- Lee, Katherine S**
The Host Immune Response to Streptococcus pneumoniae: Bridging Innate and Adaptive Immunity – 121
- Lee, Robert**
Gas Turbine Engine Carbon Oil Seals Computerized Assembly – 27
- Lee, S**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Lee, Y. Y.**
Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209
- Lee, Yoon-Chang**
An Improved Statistical Model-Based VAD Algorithm with an Adaptive Threshold – 60
- Lehman, S. K.**
Numerical Study of X-Ray Diffraction Effects within Objects – 231
- LeMaster, Edward A.**
Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 169
- Lent, Michael van**
Increasing Replayability with Deliberative and Reactive Planning – 156
- Lerman, Kristina**
Analysis of Dynamic Task Allocation in Multi-Robot Systems – 193
- Leuski, Anton**
Monitoring the News: A TDT Demonstration System – 234
- Levine, Leslie**
Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143
- Levitt, K N**
Reasoning About Programs – 153
- Levow, Gina-Anne**
Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244
- Lewellen, J. W.**
Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202
- Lewis, David**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Lewis, James**
Advanced Docking Berthing System Update – 28
- Lewis, Nate**
Reducing DoD Fossil-Fuel Dependence – 101
- Li, Guan-Cyun**
Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – 61
- Li, H.**
Numerical Simulations and an Experimental Investigation of a Finger Seal – 28
- Li, Hongbin**
Differential Space-Time Modulation for Wideband Wireless Networks – 168
- Li, Huiping**
Machine Printed Text and Handwriting Identification in Noisy Document Images – 243
- Li, Naicong**
MUC-4 Test Results and Analysis – 238
- Li, Suquan**
Thermoelectric Power Factor for Electrically Conductive Polymers – 57
- Li, Z.**
High Performance Computing in Accelerating Structure Design and Analysis – 229
- Liang, L.**
Electrosynthesis of Nanofibers and Nano-Composite Films – 35
- Liang, Tak-Keung**
Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77
- Liao, Ching-Wen**
MFXRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61
- Liemohn, M. W.**
Self-Consistent Ring Current Modeling with Propagating Electromagnetic Ion Cyclotron Waves in the Presence of Heavy Ions – 266
- Lien, Chang-Hua**
Delay-Dependent H(sub infinity) Observer-Based Control for Uncertain Neutral Systems via LMI Optimization Approach – 63
- Liliental-Weber, Z.**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- Lin, David M**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
- Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9
- Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8
- Lin, Dekang**
Construction of a Chinese-English Verb Lexicon for Embedded Machine Translation in Cross-Language Information Retrieval – 244
- Lin, Guang**
A Discontinuous Galerkin Method for Two-Temperature Plasmas – 228
- Lin, Han-Ting**
Numerical and Experimental Studies on Aluminum Sandwich Plates of Variable Thickness – 63
- Lin, Jong-Yih**
MFXRLS Based Adaptive Feed-forward Controller Implemented with Velocity Sensor Identified by Frequency Response to Improve Actuator Speaker Performance in ANC Systems – 61
- Lin, Victor**
C-20A Precision Autopilot Development – 9
- Lin, Y.**
Electrosynthesis of Nanofibers and Nano-Composite Films – 35
- Lin, Yen-Kuang**
Experimental and Numerical Investigations for the Free Vibration of Cantilever Trapezoidal Plates – 62

- Lin, Zi-Wei**
Radiation Dose from Lunar Neutron Albedo – 263
- Linde, A.**
Domain Walls, Near-BPS Bubbles and Probabilities in the Landscape – 226
- Lindheim, R.**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Lindsey, J. S.**
Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55
- Linne, Diane**
NASA In-Situ Resource Utilization Project-and Seals Challenges – 27
- Liou, L L**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
- Liou, Liyeh L**
Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8
- Lipp, S. A.**
Chip-Scale Atomic Clock (CSAC) and Method for Making Same – 203
- Lipson, M.**
Optically Controlled Photonic Switch – 217
- Lissauer, Jack J.**
The Birth of Planetary Systems – 247
- Litchford, R.**
Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51
- Litvinenko, V.**
Status of Fast IR Orbit Feedback at RHIC – 207
- Litz, Marc**
Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103
- Liu, Chang-Huan**
Controller Design and FPGA Implementation of a Speed-Sensorless Vector-Controlled Induction Motor Drive Based on Stability Consideration – 61
- Liu, Hailiang**
Rotation Prevents Finite-Time Breakdown – 177
- Liu, J.**
Electrosynthesis of Nanofibers and Nano-Composite Films – 35
- Liu, Juewen**
Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light-Up Colorimetric Sensing – 140
- Liu, Nan-Suey**
Turbulent Chemical Interaction Models in NCC: Comparison – 88
- Liu, Tiexin**
Parallel Bootload Method of Hydrogen Atomic Clock CAT System based on DSP – 258
- Liu, Y**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Loewe, R. S.**
Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – 55
- Logan, B. G.**
US Heavy Ion Beam Research for High Energy Density Physics Applications and Fusion – 202
- Long-Davis, Mary Jo**
Overview of NASA's Propulsion 21 Effort – 25
- Loredo, Elvira N**
Valuing Programmed Depot Maintenance Speed: An Analysis of F-15 PDM – 10
- Lorenz, K. T.**
Materials Response under Extreme Conditions – 231
- Lott, Casey A**
Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sterna Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005 – 244
- Lowery, Nathan**
Global Energy and Aviation Concerns – 6
- Lu, L. T.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Lu, Michael L**
Caveolin-1 Modulates Androgen Receptor Signaling in Advanced Prostate Cancer – 131
- Lu, Yadong**
Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183
- Lu, Yi**
Stimuli-Responsive Disassembly of Nanoparticle Aggregates for Light-Up Colorimetric Sensing – 140
- Lu, Yongfeng**
Fabrications of Photonic Bandgap Structures in Si and Ge Substrates Using Laser-Assisted Nanoimprinting of Self-Assembled Nanoparticles – 82
- Lucero, D. A.**
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108
- Ludwig, H.**
Overview of the SNS Accelerator Mechanical Engineering – 205
- Luetgen, Mark R**
Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – 194
- Multiscale Smoothing Error Models – 194
- Lukishova, Svetlana G**
Polarized Single-Photons on Demand - A New Source for Quantum Information – 215
- Lutkenhaus, Norbert**
Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77
- Ma, H. W.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Ma, Huanfeng**
Parsing and Tagging of Bilingual Dictionary – 242
- Maartense, Iman**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Macintosh, Bruce**
The Gemini Planet Imager – 255
- Madavan, Nateri**
Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3
- Madhukar, Anupam**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Maher, E.**
Sense Amplifier for Static Random Access Memories – 73
- Mahler, G.**
Overview of the SNS Accelerator Mechanical Engineering – 205
- Mahon, Robert**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 111
- Mahood, Nicholas V**
Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142
- Maitland, D. J.**
Shape Memory Polymer Therapeutic Devices for Stroke – 54
- Maliska, Heather A.**
Loads Clearance on a Modified, Preproduction F-15 Airplane with Intelligent Flight Controls – 267
- Mall, W.**
Shape Memory Polymer Therapeutic Devices for Stroke – 54
- Malone, Philip**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46

- Malone, Thomas W**
How Can Groups Communicate When They Use Different Languages? Translating Between Partially Shared Type Hierarchies – 244
- Manion, Sean T**
Amygdala, Anxiety and Alpha(1) Adrenoceptors: Investigations Utilizing a Rodent Model of Traumatic Stress – 124
- Manning, C. A.**
Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 5
- Marceau, Carla**
Distinguishing Novel Usage From Novel Attacks – 159
- Marchesini, S.**
Progress in Three-Dimensional Coherent X-Ray Diffraction Imaging – 232
- Markell, Kyle C**
The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11
- Maroney, Johnny**
Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – 12
- Marozkina, Nadzeya V**
The Impact of Tyrosine Kinase Signaling on Breast Cancer Development – 141
- Marrs, Terry**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Marsella, S**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Marshall, Orange S**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Martin, B. R.**
Sulfonamide Cannabinoid Agonists and Antagonists – 37
- Martinez, Sonia**
Monitoring Environmental Boundaries with a Robotic Sensor Network – 185
- Martinovski, Bilyana**
Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70
- Martinovsky, Bilyana**
The Error Is the Clue: Breakdown In Human-Machine Interaction – 163
- Martinsson, Per-Gunnar**
A Randomized Algorithm for the Approximation of Matrices – 180
- Martio, Olli**
Direct and Inverse Scattering for Beltrami Fields – 189
- Maruska, H. P.**
Structural Properties of Free-Standing 50 mm Diameter GaN Wafers with (1010) Orientation Grown on LiAlO – 54
- Masckauchan, T N**
Activation of Alternative Wnt Signaling Pathways in Human Mammary Gland and Breast Cancer Cells – 139
- Masel, Richard I**
Design Rules for High Temperature Microchemical Systems – 48
- Mason, Brian**
Cepheids in Multiple Systems: ADS 14859 – 256
- Massa, Derck**
Cepheids in Multiple Systems: ADS 14859 – 256
- Mataric, Maja J**
Analysis of Dynamic Task Allocation in Multi-Robot Systems – 193
- Matson, Charles L**
Parallelization of a Blind Deconvolution Algorithm (Postprint) – 184
- Matson, Charles**
Cramer-Rao Lower Bound for Support-Constrained and Pixel-Based Multi-Frame Blind Deconvolution (Postprint) – 173
- Matsumoto, Masayuki**
Polarization-mode Dispersion and its Mitigation – 220
- Matt, Brian**
Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174
- Matuana, L.**
Process for the Preparation of Maleated Polyolefin Modified Wood Particles in Composites and Products – 41
- Maxwell, Mike**
Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152
- Mayer, Barnhard**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Mayes, Paul E**
Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- McAlinden, Ryan**
Increasing Replayability with Deliberative and Reactive Planning – 156
- McArthur, J. Craig**
RS-25 for the NASA Cargo Launch Vehicle: The Evolution of SSME for Space Exploration – 32
- McCants, William**
Militant Ideology Atlas: Executive Report – 234
- Militant Ideology Atlas: Research Compendium** – 234
- McCarthy, Catherine E.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- McCarthy, Jim**
Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158
- McCarthy, M.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- McCaul, William E.**
Use of High-resolution WRF Simulations to Forecast Lightning Threat – 113
- McCauley, James W**
Special Workshop: Kolsky/Split Hopkinson Pressure Bar Testing of Ceramics – 58
- McCracken, Jeff**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- McDonald, J. W.**
Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
- McDonald, Shannon S**
Characterization and Optimization of a High Surface Area-Solid Phase Microextraction Sampler for the Collection of Trace Level Volatile Organic Compounds in the Field – 39
- McDowall, Ian**
Display Research at the University of Southern California – 82
- McGee, P**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- McGregor, D. S.**
Micro Neutron Detectors – 73
- McInerney, Michael K**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- McInroy, John E**
Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PRE-PRINT) – 173
- McKinley, Gareth H**
Miscibility and Viscoelastic Properties of Acrylic Polyhedral Oligomeric Silsesquioxane-Poly(methyl methacrylate) Blends (Postprint) – 57
- McMahan, Tracy A.**
Lunar e-Library: Putting Space History to Work – 262
- McMillan, Vernotto C.**
Technology Transition a Model for Infusion and Commercialization – 143

- McNaney, J. M.**
Materials Response under Extreme Conditions – 231
- Meadows, Catherine**
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
- Meadows, C**
Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68
- Meagher, Michael**
Process Research and Development of Antibodies as Countermeasures for C. Botulinum – 133
- Medhin, N G**
A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 57
- Medina, Enrique A**
Value Assessment Tools For Hybrid NDE-SHM Life Management Strategies (Preprint) – 10
- Meegan, Charles**
The GLAST Burst Monitor – 248
- Meezan, N.**
Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225
- Megret, Remi**
A Survey of Spatio-Temporal Grouping Techniques – 175
- Mehta, Jayesh**
Rotating Intershaft Brush Seal Project – 26
- Meier, W. R.**
Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225
- Meir, W.**
April 25, 2003, FY2003 Progress Summary and FY2002 Program Plan, Statement of Work and Deliverables for Development of High Average Power Diode-Pumped Solid State Lasers, and Complementary Technologies, for Applications in Energy Defense – 217
- Meitzler, Thomas**
Multiband Imagery for Concealed Weapon Detection – 92
- Mel, Bartlett**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Melcher, Kevin**
Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14

Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- Melese, Philip**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Melton, B. J.**
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108
- Melz, Eric**
The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245
- Menkov, Vladimir**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Meredith, Roger W**
Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – 212
- Merrill, Kaylani**
Identifying Error in AUV Communication – 70
- Messer, Bradley**
A Method for Calculating the Probability of Successfully Completing a Rocket Propulsion Ground Test – 19
- Meyer, George**
Guidance of Nonlinear Systems – 18
- Meyer, Patrick**
In-Space Crew-Collaborative Task Scheduling – 144
- Mezic, Igor**
Passive Control of Limit Cycle Oscillations in a Thermoacoustic System using Asymmetry – 211
- Mhaolduin, T. N.**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
- Michaud, Peter**
Gemini Focus: Newsletter of the Gemini Observatory – 248
- Michielsen, Eric**
Low-Profile Radiators in Non-Periodic Wideband Arrays – 83
- Michnoff, R.**
Analysis of Availability and Reliability in RHIC Operations – 209
- Miller, D L**
The Low Temperature Oxidation Chemistry of JP-8 and its Surrogates at High Pressure – 89
- Miller, J. Scott**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Miller, Mikel M**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
- Miller, Robert C**
Lightweight Structure in Text – 154
- Miller, Scott**
Semantic Tagging using a Probabilistic Context Free Grammar – 191
- Miller, Sharon K. R.**
Overview of Space Environment Effects on Materials and GRC's Test Capabilities – 28
- Minarcik, John R**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Minato, Naoki**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Minh, Vu Quang**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Miraglia, D**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Mirghafori, N**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Mirocha, J. D.**
Consequences of the Large-Scale Subsidence Rate on the Stably Stratified Atmospheric Boundary Layer Over the Arctic Ocean, as Seen in Large-Eddy Simulations – 114
- Mitchell, K. J.**
Online Victimization: A Report on the Nation's Youth – 147
- Mitchell, K.**
Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66

Online Victimization of Youth: Five Years Later – 147
- Mitter, S K**
Some Discrete Approximations to a Variational Method for Image Segmentation – 187
- Mitter, Sanjoy K**
An Interim Report of Research on Stochastic and Adaptive Systems – 191

Integration with Respect to Operator-Valued Measures with Applications to Quantum Estimation Theory – 233
- Miyakawa, M.**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- Miyazaki, Tetsuya**
Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220
- Mizuno, Y.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Modugno, Francesmary**
Bone Mineral Density, Sex Steroid Genes, Race and Prostate Cancer Risk – 132
- Moir, R. W.**
Analyses in Support of Z-IFE LLNL Progress Report for FY-05 – 225

- Moisander, Pia**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – [117](#)
- Molvik, A. W.**
New Experimental Measurements of Electron Clouds in Ion Beams with Large Tune Depression – [227](#)
Planning Electron Cloud/Gas Desorption Activities in the HIF-VNL-during FY06 – [227](#)
- Monard, B**
On the Search for Transits of the Planets Orbiting Gliese 876 – [256](#)
- Monell, Donald W.**
Crew Launch Vehicle (CLV) Avionics and Software Integration Overview – [12](#)
- Montag, C.**
Status of Fast IR Orbit Feedback at RHIC – [207](#)
- Montgomery, Christine A**
MUC-3 Test Results and Analysis – [144](#)
MUC-4 Test Results and Analysis – [238](#)
- Montgomery, Edward E., IV**
Recent Advances in Solar Sail Propulsion at NASA – [33](#)
- Montgomery, Edward E.**
Mercury Sample Return using Solar Sails – [264](#)
- Montheillet, F**
Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – [53](#)
- Monz, Christof**
Symbolic MT With Statistical NLP Components – [169](#)
- Mooney, James t.**
Larger, Lighter Space Telescopes by Implementing In-Space Manufacturing Concepts – [19](#)
- Moore, B**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – [175](#)
- Moore, Jim**
A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – [223](#)
- Moore, Johanna D**
Indexing and Exploiting a Discourse History to Generate Context-Sensitive Explanations – [152](#)
- Moore, Robert C**
The Role of Logic in Knowledge Representation and Commonsense Reasoning – [198](#)
- More, Greg**
High Temperature Metallic Seal Development For Aero Propulsion and Gas Turbine Applications – [27](#)
- Morefield, Sean**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – [46](#)
- Morikawa, Hiroyuki**
Experimental Study of a Burst-Switched WDM Network Testbed – [221](#)
- Morioka, Toshio**
A Study for Technology of Controlling Next-Generation Backbone Network – [219](#)
- Moritz, Eric J**
Reducing C-17 Pilot Training Delays – [6](#)
- Morris, Kenneth B.**
The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – [20](#)
- Morrison, Clayton T**
An Image Schema Language – [172](#)
- Morrison, Joseph H.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – [91](#)
- Morton, Y T**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – [8](#)
Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – [8](#)
- Mossell, E.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – [116](#)
- Motzet, Guenter**
Time Triggered Protocol (TTP) for Integration Modular Avionics (IMA) – [32](#)
- Mu, Wei**
An Image Schema Language – [172](#)
- Mukherjee, A. K.**
Preparation of Nanocomposites of Alumina and Titania – [53](#)
- Mukherjee, Sayan**
Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – [170](#)
- Munsky, Brian**
Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – [118](#)
- Murai, Hitoshi**
EA Modulator Based OTDM Technique for 160 Gb/s Optical Signal Transmission – [221](#)
- Murphy, David M**
Flare Cue Symbolology for Zero-Zero Weather Landings – [5](#)
- Murphy, John P**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – [45](#)
- Murphy, Kelly J.**
Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – [91](#)
- Murray, Elizabeth O**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – [100](#)
- Murray, G C**
TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – [245](#)
- Murthy, Shree**
Dynamics of a Loop-Free Path-Finding Algorithm – [163](#)
Routing in Packet-Switched Networks Using Path-Finding Algorithms – [188](#)
- Muthukumaran, K.**
Synthesis of Phosphono-Substituted Porphyrin Compounds for Attachment to Metal Oxide Surfaces – [55](#)
- Muti, Paola**
Endogenous 6-Hydroxylmelatonin Excretion and Subsequent Risk of Breast Cancer: A Prospective Study – [140](#)
- Myers, Richard**
Ground Layer AO (GLAO): A 'Third Gemini' – [254](#)
- Myers, S. C.**
Hierarchical Bayesian Approach to Locating Seismic Events – [190](#)
- Nagle, Daniel**
Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – [80](#)
- Nagle, Samuel M**
Coherence Estimation of Shallow Water Acoustic Narrowband CW Pulsed Signals – [212](#)
- Naik, C. V.**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – [39](#)
- Nakagawa, Goji**
Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – [222](#)
- Nambu, Yoshihiro**
Secure Communication with Quantum Cryptography – [76](#)
- Narayanan, M.**
Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006) – [101](#)
- Narayanan, S**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – [71](#)

- Narayanan, Shrikanth**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70
- Naruse, Makoto**
Highly Efficient Optical Communication Technologies: Multi-level Optical Transmission and Ultra-high Density Optical Signal Processing – 220
Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Naruse, Yuuichi**
Experiments of a Terabit-Class Super-Network – 220
- Natarajan, V.**
Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
Volumetric Data Analysis Using Morse-Smale Complexes – 149
- Nehls, Mary K.**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Nelson, A.**
FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- Nelson, George**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97
- Nelson, M.**
Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – 102
- Neu, David**
Rutgers Filtering Work at TREC 2002: Adaptive and Batch – 242
- Newchurch, Michael**
Exploring the Production of NO_x by Lightning and Its Impact on Tropospheric Ozone – 111
- Newfield, Mark E.**
Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 90
- Newill, James F**
Another Analytical Approach to Predicting Munition Trajectories – 111
- Newswander, Daniel**
Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
- Newton, Anthony M**
Configurable Aerospace Command and Control (CACC) – 65
- Ngu, Yves**
Model of High-Energy-Density Battery Based on SiC Schottky Diodes – 103
- Nikoukhah, Ramine**
Modeling and Estimation of Multiresolution Stochastic Processes – 193
- Nilsson, Nils J**
Shakey the Robot – 171
- Nishikawa, K.-I.**
GRMHD Simulations of Jet Formation with RAISHIN – 260
- Nishiki, Akihiko**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Nishioka, Itaru**
Experiments of a Terabit-Class Super-Network – 220
- Nishioka, Tsuyoshi**
Secure Communication with Quantum Cryptography – 76
- Noebe, Ronald**
Progress on Shape Memory Alloy Actuator Development for Active Clearance Control – 14
- Noonan, J.**
Field Emission Cathode Gating for RF Electron Guns and Planar Focusing Cathodes – 202
- Norris, Andrew T.**
Turbulent Chemical Interaction Models in NCC: Comparison – 88
- Nossal, Michael**
Comparing User-assisted and Automatic Query Translation – 243
- Nunes, Luis Romeu**
Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77
- Nunnally, William**
Compact, Portable Pulsed-Power – 201
- Oard, Doug**
Parsing and Tagging of Bilingual Dictionary – 242
- Oard, Douglas W**
Comparing User-assisted and Automatic Query Translation – 243
Probabilistic Structured Query Methods – 245
TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245
- Oates, Christie S**
Psychological and Metabolic Correlates of Obesity in African-Americans and Caucasians – 118
- Oates, William S**
Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 95
Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96
- O'Brien, John**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Odell, Douglas L**
Performance of a Two-Hydrophone Heading Sensor and AUV Formation Flying Controller – 213
- ODell, S.**
Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51
- Oh, Man-Suk**
Bayesian Multidimensional Scaling and Choice of Dimension – 178
- Ohmes, M. F.**
Micro Neutron Detectors – 73
- Ohtani, Naoki**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Okamoto, Akira**
Regulating a Formation of a Large Number of Vehicles – 173
- Okano, Naoki**
Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Okita, Hideki**
Experiments of a Terabit-Class Super-Network – 220
- Olsen, Knut**
M31 Star Formation Histories – 249
- Olsen, Mike**
Computational Simulation of Semispan Wings in Wind Tunnels – 2
- Oman, Paul**
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- O'Moore, Kathleen M**
Rapid IV Versus Oral Rehydration: Responses to Subsequent Exercise Heat Stress – 142
- Onaka, Hiroshi**
Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222
- ONEILL, Mark**
Impact of Solar Array Designs on High Voltage Operations – 30
- Orme, J. P.**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
- O'Rourke, Michael**
Identifying Error in AUV Communication – 70
- Osborn, D. J.**
Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72
- Ostashev, Vladimir E**
Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
- Oswald, Jay**
An Update on Structural Seal Development at NASA GRC – 28
Elastomeric Seal Development for Advanced Docking/Berthing System – 26

- Metallic Seal Development for Advanced Docking/Berthing System – 52
- Overview of NASA Glenn Seal Project – 29
- Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- Otsuki, Hideki**
A Study for Technology of Controlling Next-Generation Backbone Network – 219
- Ott, R. D.**
Pulse Thermal Processing of Functional Materials Using Directed Plasma Arc – 35
- Ou, Suichuan**
Turbine Aerothermal Research – 15
- Owens, Charles**
Requirements and Techniques for Developing and Measuring Simulant Materials – 266
- Packer, Bonnie**
Standardized UXO Technology Demonstration Site Blind Grid Scoring Record No. 792 – 186
- Padoan, P.**
Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261
- Page, William**
Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – 210
- Pai, C.**
Overview of the SNS Accelerator Mechanical Engineering – 205
- Pair, Jarrell**
Display Research at the University of Southern California – 82
- Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems – 92
- Pamadi, Bandu N.**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Pan, Ching Tsai**
Journal of The Chinese Institute of Engineers, Volume 29, No. 5 – 60
- Pan Isacker, P.**
Isovector Pairing within the so(5) Richardson-Gaudin Exactly Solvable Model – 206
- Panepucci, R. R.**
Optically Controlled Photonic Switch – 217
- Paolillo, Roger**
Advanced Seal Rig Experiments and Analysis – 25
- Paque, J.**
Turbulent Size Selection and Concentration of Chondrule-Sized Objects: Reynolds Number Invariance and Implications – 265
- Park, Chung S.**
Computational Analysis of Shock Layer Emission Measurements in an Arc-Jet Facility – 90
- Park, Hyuk R**
TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245
- Parker, Allen R., Jr.**
High-Speed Fiber Bragg Grating Interrogation System Development – 158
- Paschen, Jana**
Hybrid Drive Partnerships Keep the Army on the Right Road – 59
- Pascucci, V.**
Topology-Based Simplification for Feature Extraction from 3D Scalar Fields – 149
- Volumetric Data Analysis Using Morse-Smale Complexes – 149
- Pashley, David N**
Summary of a Regional Workshop on Monitoring Programs for the Interior Least Tern (*Sterna Antillarum*) - Tulsa, Oklahoma, 15-16 November 2005 – 244
- Pashley, R. M.**
Process for the Production of Emulsions and Dispersions – 43
- Patrick, Brian**
A Novel Concept for a Deformable Membrane Mirror for Correction of Large Amplitude Aberrations – 223
- Patterson, Chad**
Comparison of Electromagnetic Simulation Results with Experimental Data for an Aperture-Coupled C-Band Patch Antenna – 79
- Patterson, Howard H**
Development of a Rapid Decontamination System for the Nerve Agents – 49
- Paul, P.**
WTEC Panel Report on High-End Computing Research and Development in Japan – 150
- Pavlov, G.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Pavlovic, Dusko**
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
- Pavlovich, Christian P**
Prostate Cancer Detection by Molecular Urinalysis – 136
- Pazol, Brian**
Acoustic Communication With Small UUVs Using a Hull-Mounted Conformal Array – 80
- Pearl, Lisa**
Mapping WorldNet Senses to a Lexical Database of Verbs – 237
- Pearson, C.**
Overview of the SNS Accelerator Mechanical Engineering – 205
- Pearson, J. Boise**
Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264
- Peles, Slaven**
Stochastic Analysis of Gene Regulatory Networks using Finite State Projections and Singular Perturbation – 118
- Pendleton, G.**
Radiation Dose from Lunar Neutron Albedo – 263
- Pereira, Fernando C N**
Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172
- Pereira, Fernando C**
Incremental Interpretation – 236
- Periannan, Vijayanand**
The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11
- Person, Suzette**
Controlling Factors in Evaluating Path-sensitive Error Detection Techniques – 186
- Parallel Randomized State-Space Search – 174
- Pertwee, R. G.**
Sulfonamide Cannabinoid Agonists and Antagonists – 37
- Peters, C. J.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- Peterson, Carolyn Collins**
Gemini Focus: Newsletter of the Gemini Observatory – 248
- Peterson, J M**
Hybrid Algorithm for Robust, Real-Time Source Localization in Reverberant Environments – 184
- Petros, Mulugeta**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Petzar, Paul J.**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Pfeiderer, E. M.**
Relationship of Sector Activity and Sector Complexity to Air Traffic Controller Taskload – 5
- Philipsen, Iwan**
Stepwise Regression Analysis of MDOE Balance Calibration Data Acquired at DNW – 18

- Phillips, Michael**
The MIT Summit Speech Recognition System: A Progress Report – 195
- Piazza, Anthony**
Fiber Optic Sensor Attachment Development and Performance Evaluations – 224
High-Speed Fiber Bragg Grating Interrogation System Development – 158
- Piepol, Diane**
Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems – 92
- Pierson, Hazel**
Numerical Simulations and an Experimental Investigation of a Finger Seal – 28
- Pilat, F.**
Analysis of Availability and Reliability in RHIC Operations – 209
- Pilewskie, Peter**
Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Ping, Jingsong**
Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 259
- Pishko, Michael V**
Microfabricated Multianalyte Sensor Arrays for Metabolic Monitoring – 123
- Pishko, Michael**
Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122
- Piszczor, Mike**
Impact of Solar Array Designs on High Voltage Operations – 30
- Pitesky, M. E.**
Distinguishing Seven Species of Bacillus Spores Using BioAerosol Mass Spectrometry – 108
- Pitts, Julius**
Effect of Solventless Bore Cleaning Device (SBCD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Pitz, W. J.**
Modeling and Experimental Investigation of Methylcyclohexane Ignition in a Rapid Compression Machine – 39
- Pixton, D. S.**
Internal Coaxial Cable Electrical Connector for Use in Downhole Tools – 72
- Poggio, Tomaso**
Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170
- Poletto, Giannina**
The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266
- Pollack, Martha E**
Incremental Interpretation – 236
- Pollaine, S.**
Materials Response under Extreme Conditions – 231
- Pommier, John**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Poovendran, Radha**
A General Probabilistic Model for Improving Key Assignment in Wireless Networks – 67
COBRA: Center-Oriented Broadcast Routing Algorithms for Wireless Ad Hoc Networks – 188
Coverage in Heterogeneous Sensor Networks – 197
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
HiRLoc: High-resolution Robust Localization for Wireless Sensor Networks – 80
Iterated Local Optimization for Minimum Energy Broadcast – 185
Secure Localization for Wireless Sensor Networks using Range-Independent Methods – 162
Security Analysis and Extensions of the PCB Algorithm for Distributed Key Generation – 174
SeRLoc: Robust Localization for Wireless Sensor Networks – 162
- Poovendran, R**
Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68
- Potter, C. S.**
Global Analysis of Empirical Relationships Between Annual Climate and Seasonality of NDVI – 98
- Prather, Dennis**
Photonic Band Gap Devices for Commercial Applications – 232
- Prestipino, Joseph**
Maritime Planning Support System (MPSS) for Fleet Battle Experiment Juliet (FBE-J) – 158
- Price, A**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Pritchett, Victor E.**
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31
- Proctor, Margaret**
Overview of NASA Glenn Seal Project – 29
- Prufert-Bebout, Leslie**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Pueschel, R. F.**
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 109
- Purandare, Rahul**
Parallel Randomized State-Space Search – 174
- Pusey, Marc**
Fluorescence Approaches to Growing Macromolecule Crystals – 35
- Qi, Jinbo**
Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
- Qin, Q.**
Single Particle Beam Dynamics Design of BSNS/RCS – 205
- Qiu, Jing-Mei**
Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182
- Quattrochi, Dale A.**
Spatial Growth Modeling and High Resolution Remote Sensing Data Coupled with Air Quality Modeling to Assess the Impact of Atlanta, Georgia on the Local and Regional Environment – 99
- Quinn, George D**
Special Workshop: Kolsky/Split Hopkinson Pressure Bar Testing of Ceramics – 58
- Radovic, Miladin**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97
- Raftery, Adrian E**
Bayesian Multidimensional Scaling and Choice of Dimension – 178
- Raftery, Jr, James J**
Photonic Crystal Light Emitting Diodes – 95
- Ragan, K.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Rai, Man Mohan**
Application of Artificial Neural Networks to the Design of Turbomachinery Airfoils – 3
Direct Numerical Simulations of Boundary Layer Transition on a Flat Plate – 90
- Rajagopal, K. R.**
Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency – 13
- Rajala, Andrew G**
Identifying Error in AUV Communication – 70

- Rajala, Andrew**
Allocating AUVs for Mine Map Development in MCM – 101
- Raju, Jyoti**
Distributed Assignment of Codes in Multihop Radio Networks – 71
- Ramachandran, Narayanan**
Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38
- Ramachandran, Surya**
Knowledge Acquisition using an English-Based Method Editor – 177
- Ramachandran, Vijay**
Incentive-Compatible Interdomain Routing – 160
Robustness of Path-Vector Protocols Without Independent Route Ranking – 198
- Ramaswamy, S.**
Sense Amplifier for Static Random Access Memories – 73
- Rambow, Owen**
Rhetoric as Knowledge – 238
- Ramsey, B.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Ramsey, Brian**
Electro-Chemically Enhanced Mechanical Polishing of Nickel Mandrels – 216
- Ramsey, J. L.**
Joint Sandia/NIOSH Exercise on Aerosol Contamination Using the BROOM Tool – 108
- Rao, I. J.**
Investigation into the Mechanics of Single Crystal Turbine Blades with a View Towards Enhancing Gas Turbine Efficiency – 13
- Rathbone, R.**
Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – 105
- Ray, C. S.**
Isothermal Analysis of the Crystallization Kinetics in Lithium Disilicate Glass using Trans Temp Furnace – 228
- Ray, Chandra S.**
Computer Modeling of Thermal Convection in Melts to Explain Glass Formation in Low Gravity and on Earth – 38
- Rayos, Elonsio M.**
Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- Razdan, R. K.**
Sulfonamide Cannabinoid Agonists and Antagonists – 37
- Redifer, Matt**
C-20A Precision Autopilot Development – 9
- Reed, D. S.**
Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Reese, Gayle**
Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223
- Reid, Robert S.**
Experimental Evaluation of a Water Shield for a Surface Power Reactor – 264
- Reidy, Denis M**
Computational Prediction of Kinetic Rate Constants – 47
- Reising, John M**
Flight Display Integration – 17
- Reitz, T L**
Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103
- Remberger, M.**
Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44
Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45
- Reminga, Jeff**
DyNetML: Interchange Format for Rich Social Network Data – 246
- Remington, B. A.**
Materials Response under Extreme Conditions – 231
- Ren, W. X.**
Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96
Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97
- Resnick, Philip**
The Web as a Parallel Corpus – 243
- Reuter, James L.**
Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22
- Rexford, Jennifer**
Learning-Based Anomaly Detection in BGP Updates – 159
- Rice, Betsy M**
Molecular Simulation of Shocked Materials Using Reaction Ensemble Monte Carlo: Part 1. Application to Nitrogen Dissociation – 186
- Richards, Lance**
Fiber Optic Sensor Attachment Development and Performance Evaluations – 224
High-Speed Fiber Bragg Grating Interrogation System Development – 158
- Richardson, Kalin**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Richardson, Lea**
In-Space Crew-Collaborative Task Scheduling – 144
- Rickman, Doug**
Requirements and Techniques for Developing and Measuring Simulant Materials – 266
- Rickman, Steven L.**
Space Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments – 29
- Riedl, Mark O**
Increasing Replayability with Deliberative and Reactive Planning – 156
- Ries, L. A. G.**
Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Riffle, Judy S**
Toward High Magnetic Moment, Controlled-Size, Blood Dispersible Nanoparticles: An Enabling Technology for Biomagnetics Interfacing Concepts – 119
- Rigaut, Francois**
Gemini Adaptive Optics Program: An Overview – 250
MCAO at Gemini – 250
- Ringwald, F**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Rivas, Flor**
Brush Seals for Improved Steam Turbine Performance – 24
- Rivera, E J**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Rivers, S. Melissa**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Rivir, Richard B**
Turbine Aerothermal Research – 15
- Rizk, Yehia**
Computational Simulation of Semispan Wings in Wind Tunnels – 2
- Roberts, Kathryn J.**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Roberts, Lily M.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- Robertson, Lawrence M**
Rapid, Robust, Optimal Pose Estimation from a Single Affine Image (PRE-PRINT) – 173

- Robinson, Kimberly F.**
NASA Crew Launch Vehicle Flight Test Process – 30
- Robinson, Rodney A**
Benefit Analysis of SPC Panel SP-3 Projects and Evaluation of SPC Panel SP-3 Management and Administration – 36
- Robinson, Scott B**
Physiological Responses to Heat Stress in the Joint Protective Aircrew Ensemble (JPACE) Coverall With Varied Protective Equipment – 143
- Robinson, Susan**
Evaluation of Multi-Party Reality Dialogue Interaction – 155
Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70
- Robl, T.**
Advance Multi Product Coal Utilization By Product Processing Plant. Technical Progress Report for the Period: 1 January 2006 to 31 March 2006 – 105
- Rocklin, Vladimir**
A Randomized Algorithm for the Approximation of Matrices – 180
- Rockwell, Benjamin A**
An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – 94
- Rogers, Heather L**
Cognitive Function and Emotional Status of Middle-aged Chinese Hypertensive Patients Without Detectable White Matter Brain Lesions or Lacunar Infarctions – 120
- Rokhlin, Vladimir**
A Randomized Algorithm for the Approximation of Matrices – 180
- Rosen, M. D.**
Fundamentals of ICF Hohlräume – 226
- Rosenfeld, Azriel**
Compressed Video Segmentation – 171
- Roser, T.**
Non-Scaling FFAG for Rare Isotopes Production – 209
- Ross, S.**
Local Measurement of Electron Density and Temperature in High Temperature Laser Plasma Using the Ion-Acoustic Dispersion – 225
- Ross, T S**
Appropriate Measures and Consistent Standard for High Energy Laser Beam Quality (Postprint) – 95
- Rossebo, Bryan**
Using SPARK-Ada to Model and Verify a MILS Message Router – 155
- Rothman, M. A.**
Interpretation of Diamagnetic Signals – 205
- Roukes, M. L.**
WTEC Panel Report on Spin Electronics – 75
- Rowell, Ginger Holmes**
Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223
- Rowlands, N.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Roy, Jean-Rene**
Gemini South Science Highlights – 254
Gemini Adaptive Optics Program: An Overview – 250
- Rozenberg, Gabriel I**
Epithelial Interactions and the Angiogenic Phenotype of Breast Cancer – 132
- Rucker, Rochelle N.**
MISSE PEACE Polymers Atomic Oxygen Erosion Results – 54
- Ruffa, Anthony A**
Method to Estimate Noise in Data – 195
Miniature Low Frequency Acoustic Transmitter – 85
- Ruggiero, A. G.**
Non-Scaling FFAG for Rare Isotopes Production – 209
- Rumsey, Christopher L.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Runkel, M.**
System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222
- Runyon, Cassandra**
Moon Mineralogy Mapper: Unlocking the Mysteries of the Moon – 265
- Ruspini, Enrique H**
The Logical Foundations of Evidential Reasoning (revised) – 183
- Russell, Kevin L**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Russell, Pamela J**
Formulated Delivery of Enzyme/Prodrug and Cytokine Gene Therapy to Promote Immune Reduction of Treated and Remote Tumors in Mouse Models of Prostate Cancer – 130
- Russell, Philip B.**
Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
- Russell, T F**
Three-Dimensional Finite-Volume EL-LAM Implementation – 184
- Ryan, Margaret A**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Sacksteder, Kurt**
NASA In-Situ Resource Utilization Project-and Seals Challenges – 27
- Sadigh, B.**
FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- Saini, Subhash**
Computational Nanoelectronics and Nanotechnology at NASA ARC – 86
- Saint-Jean, Felipe**
Java Implementation of a Single-Database Computationally Symmetric Private Information Retrieval (cSPIR) Protocol – 240
- Sakamoto, Takahide**
Advanced Optical Modulators for Next-generation Photonic Networks – 219
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Salamango, Mark J**
Pervasive Computing: Why Did the Logistics Soldier Cross the Road? – 156
- Salem, Jonathan A.**
Fracture Toughness of Thin Plates by the Double-Torsion Test Method – 97
- Sallis, R E**
Prevention of Cold Injuries During Exercise – 142
- Salon, S.**
General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208
- Salvendy, Gavriel**
A Review and Reappraisal of Adaptive Human-Computer Interfaces in Complex Control Systems – 146
- Samimy, M.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Samuels, Jr, J R**
A Stick-Slip/Rouse Hybrid Model for Viscoelasticity in Polymers – 57
- Sandberg, Richard D**
Simulation of Supersonic Base Flows: Numerical Investigations Using DNS, LES, and URANS – 3
- Sanders, David B.**
AO Imaging of Quasar Host Galaxies – 252

- Sanghi, Ritika**
An Examination of Remote Access Help Desk Cases – 160
- Sarkar, Devanand**
Novel Therapeutic Approach for Breast Cancer – 134
- Sasaki, Kensuke**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Sasaki, Masahide**
Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77
Status of Development of Photon Number Resolving Detectors – 76
- Saylor, Daniel A**
Advancements in Dynamic Scene Projection Technologies at the U.S. Army Aviation and Missile Command – 81
Current Status of IR Scene Projection at the U.S. Army Aviation and Missile Command – 82
- Scalan, T. S.**
Thyronamine Derivatives and Analogs and Methods of Use Thereof – 36
- Schabes, Yves**
Two Recent Developments in Tree Adjoining Grammars: Semantics and Efficient Processing – 145
- Schaechter, David B.**
Experimental Demonstration of Technologies for Autonomous On-Orbit Robotic Assembly – 169
- Schamus, John**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
- Schapira, Michael**
Incentive-Compatible Interdomain Routing – 160
- Schein, J.**
Radiation-Driven Hydrodynamics of Long Pulse Hohlraums on the National Ignition Facility – 227
- Schek, J. L.**
Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235
- Schick, I C**
Robust Wavelet Thresholding for Noise Suppression – 212
- Schiller, A.**
Soft Radiative Strength in Warm Nuclei – 215
- Schlie, Laverne**
Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – 210
- Schmid, Beat**
Estimates of the Spectral Aerosol Single Sea Scattering Albedo and Aerosol Radiative Effects during SAFARI 2000 – 113
- Schmidt, Melisa**
Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – 168
- Schmitt, Carl G.**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Schneider, M. B.**
Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlraums – 203
- Schreiber, Jeffrey G.**
Summary of Stirling Converter Testing at NASA Glenn Research Center – 88
- Schulthess, T. C.**
Multiple Walkers in the Wang-Landau Algorithm – 150
- Schwartz, M.**
Wind Resource Mapping for USA Off-shore Areas – 102
- Schwartz, Richard J.**
Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91
- Sclanfani, Anthony J.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Seaford, C. Mark**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Segars, Matt G.**
Potential SSP Perfluorooctanoic Acid Related Fluoropolymer Materials Obsolescence – 43
- Seidl, P. A.**
Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
- Self, Tim**
The Challenges of Integrating NASA's Human, Budget, and Data Capital within the Constellation Program's Exploration Launch Projects Office – 20
- Selvaggi, J.**
General Method for Calculating the External Magnetic Field from a Cylindrical Magnetic Source Using Toroidal Functions – 208
- Semiatin, S L**
Hot Working of High-Purity Nickel-Niobium Alloys (Preprint) – 53
- Sen, S.**
Net Shaped Component Fabrication of Refractory Metal Alloys using Vacuum Plasma Spraying – 51
- Sendersky, Radislav**
Two-Dimensional Multi-Domain Hybrid Spectral-WENO Methods for Conservation Laws – 199
- Seneff, Stephanie**
The MIT Summit Speech Recognition System: A Progress Report – 195
- Sengupta, Kishore**
Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory – 240
- Sercovich, Mark J**
Human Immunodeficiency Virus Type 1 (HIV-1) Viral Protein R (Vpr)-Mediated Cell Cycle Arrest: An Analysis of Current Mechanistic Models – 121
- Serre, Thomas**
Feature Reduction and Hierarchy of Classifiers for Fast Object Detection in Video Images – 170
- Sethian, James A.**
Numerical Schemes for the Hamilton-Jacobi and Level Set Equations on Triangulated Domains – 151
- Sexton, D.**
Development of BPM Electronics at the JLAB FEL – 232
- Sexton, Jeffrey D.**
Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22
- Sezer, Ali D**
Dynamic Importance Sampling for Queueing Networks – 192
- Shafer, Sarah T**
Behavioral and Biological Effects of Housing Conditions and Stress in Male Rats - Relevance to Heart Disease – 123
- Shakouri, Ali**
Thermoelectric Power Factor for Electrically Conductive Polymers – 57
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Shalf, J. M.**
NERSC Sustained System Performance (SSP) Metric – 147
- Shams, Qamar A.**
Phase Calibration of Microphones by Measurement in the Free-field – 211
- Shang, N. C.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Shankland, P D**
On the Search for Transits of the Planets Orbiting Gliese 876 – 256
- Shao, Zhengyi**
Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 256
- Sharkawy, Ahmed**
Photonic Band Gap Devices for Commercial Applications – 232
- Sharma, Dipali**
Elucidation of Chromatin Remodeling Machinery Involved in Regulation of Estrogen Receptor Alpha Expression in Human Breast Cancer Cells – 135

- Sharma, Shashi K**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Sharp, Jeremy M**
The Middle East Television Network: An Overview – 69
- Shaughnessy, Dennis**
High Misalignment Carbon Seals for the Fan Drive Gear System Technologies – 29
- Shaw, G. A.**
Method for Fabricating Giant Magnetoresistive (GMR) Devices – 74
- Shea, Charlotte A.**
Lunar e-Library: Putting Space History to Work – 262
- Sheehan, Michael**
Gemini's Adaptive Optics Program: An Overview – 250
Gemini's Laser Guide Star Facility – 248
- Sheiber, Stuart M**
Notes from the Unification Underground: A Compilation of Papers on Unification-Based Grammar Formalisms – 172
- Shi, Shouyuan**
Photonic Band Gap Devices for Commercial Applications – 232
- Shiah, Yui-Chuin**
Electromechanical Responses of Optical Fibers with Piezoelectric Coatings – 74
- Shin, Kang G**
Design of Location Service for a Hybrid Network of Mobile Actors and Static Sensors – 161
- Shinada, Satoshi**
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Shirkey, Richard Clg**
High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115
- Shivers, C. Herbert**
NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23
- Shivers, Charles H.**
Industrial and Systems Engineering Applications in NASA – 60
- Shope, R.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- Shriberg, E**
The ICSI+ Multilingual Sentence Segmentation System – 197
- Shu, Chi-Wang**
Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182
Convergence of Godunov-Type Schemes for Scalar Conservation Laws Under Large Time Steps – 182
Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183
- Shu, Fengchun**
Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 257
- Shultis, J. K.**
Micro Neutron Detectors – 73
- Shumway, Robert H**
Advances in Mixed Signal Processing for Regional and Telesismic Arrays – 191
- Sidi-Yekhlef, A.**
Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207
- Siewiorek, Daniel**
An Examination of Remote Access Help Desk Cases – 160
- Siler, Richard**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Simon, Donald L.**
Hybrid Kalman Filter: A New Approach for Aircraft Engine In-Flight Diagnostics – 14
- Simons, Douglas**
Adaptive Optics: A Core Gemini Program – 251
Gemini South Adaptive Optics Imager – 251
- Simpson, J. T.**
Composite, Nanostructured, Super-Hydrophobic Material – 41
Composite, Ordered Material Having Sharp Surface Features – 41
- Sims, Jon**
The Development of NASA's Low Thrust Trajectory Tool Set – 33
- Singh, Abhyudai**
Moment Closure for the Stochastic Logistic Model – 190
- Singh, Upendra N.**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Sinha, D. N.**
Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- Sinha, N. N.**
Non-Invasive Acoustic Technique for Mixing and Segregation of Fluid Suspensions in Microfluidic Applications – 87
- Smith, Besa**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Smith, Bradley R**
Policy-Aware Connectionless Routing – 166
- Smith, Jason M.**
The Molecular Ecology of Guerrero Negro: Justifying the Need for Environmental Genomics – 117
- Smith, Jeremy**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Smith, Nadine**
Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122
- Smith, Noah A**
The Web as a Parallel Corpus – 243
- Smith, Ralph C**
Experimental Implementation of a Hybrid Nonlinear Control Design for Magnetostrictive Actuators – 95
Experimental Implementation of a Nonlinear Control Method for Magnetostrictive Transducers – 96
- Smithers, Gweneth A.**
A One-Piece Lunar Regolith-Bag Garage Prototype – 264
- Snively, R.**
High Energy Electron Transport in Solids – 206
- Snoddy, Jim**
Development of the J-2X Engine for the Ares I Crew Launch Vehicle and the Ares V Cargo Launch Vehicle: Building on the Apollo Program for Lunar Return Missions – 22
- Snow, Michael P**
Flight Display Integration – 17
- Snyder, Carl E**
Study of Hydraulic System Component Storage with a Rust Inhibited Barium Free Development Hydraulic Fluid Candidate – 89
- Soderlind, P.**
Phase Stability in Heavy f-Electron Metals from First-Principles Theory – 51
- Sohn, E J**
Multiband Imagery for Concealed Weapon Detection – 92
- Sondergaard, Rolf**
Turbine Aerothermal Research – 15
Ultra High Work, High Efficiency Turbines For UAVs – 12
- Songyang, Zhou**
A Proteomic Approach to Identify Phosphorylation-Dependent Targets of BRCT Domains – 123

- Sorensen, Kirk F.**
The Crossbow Air Launch Trade Space – 5
- Sotobayashi, Hideyuki**
Supercontinuum Generation and its Applications – 77
- Spivey, Natalie**
QuietSpike(TradeMark) Build-Up Ground Vibration Testing Approach – 268
- Spohn, Marcelo**
Efficient Routing in Packet-Radio Networks Using Link-State Information – 67
- Srinivasan, R.**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50
- Srivastava, Deepak**
NanoElectronics and BioElectronics – 75
- St Amant, Robert**
An Image Schema Language – 172
- Stahl, H. Phil**
Mirror Technology Roadmap – 216
- Stahl, H. Philip**
Multivariable Parametric Cost Model for Ground Optical Telescope Assembly – 223
The First Light Machine – 223
- Stalls, Bonnie G**
MUC-3 Test Results and Analysis – 144
MUC-4 Test Results and Analysis – 238
- Stanley, Robyn**
Tools for Requirements Management: A Comparison of Telelogic DOORS and the HiVe – 158
- Steinetz, Bruce M.**
2005 NASA Seal/Secondary Air System Workshop, Volume 1 – 24
Overview of NASA Glenn Seal Project – 29
- Steinetz, Bruce**
An Update on Structural Seal Development at NASA GRC – 28
Elastomeric Seal Development for Advanced Docking/Berthing System – 26
Investigations of Shuttle Main Landing Gear Door Environmental Seals – 27
Metallic Seal Development for Advanced Docking/Berthing System – 52
Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- Steinfeld, Aaron**
An Examination of Remote Access Help Desk Cases – 160
- Stephan, Jens**
Evaluation of Multi-Party Reality Dialogue Interaction – 155
- Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
- Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70
- Sterm, Michael**
Signaling Pathways Controlling the Growth and Proliferation of Drosophila Perineurial Glial Cells – 122
- Sternhufvud, C.**
Features of Non Technical Measures and Their Importance in Cost Effective Abatement of Air Pollutant Emissions: Applied to Two Meta-Analyses – 109
- Stewart, Alan F.**
Optical Coatings and Surfaces in Space: MISSE – 217
- Stieber, Joseph**
Reproductive Ontogeny of Wheat Grown on the MIR Space Station – 247
- Stimming, Ulrich**
Developing of Design Criteria for Highly Efficient Fuel Cells – 104
- Stockton, Alan**
AO Imaging of Quasar Host Galaxies – 252
- Stoliker, Patrick**
2005 Engineering Annual Report – 267
- Strassel, Stephanie**
Linguistic Resource Creation for Research and Technology Development: A Recent Experiment – 152
- Strawa, A. W.**
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSSs? – 109
- Strohmaier, E.**
NERSC Sustained System Performance (SSP) Metric – 147
- Stroman, Richard O**
Actuator Trade-Off Analysis for DARPA/BOSS Prototype II – 83
- Stroud, Carlos R**
Polarized Single-Photons on Demand - A New Source for Quantum Information – 215
- Strovers, Brian**
C-20A Precision Autopilot Development – 9
- Stumberger, Robert E**
MUC-3 Test Results and Analysis – 144
- Stumberger, Robert E**
MUC-4 Test Results and Analysis – 238
- Subotin, Michael**
TDT-2002 Topic Tracking at Maryland: First Experiments with the Lemur Toolkit – 245
- Suderman, M. T.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- Suess, Steven T.**
The Role of Current Sheets in Solar Eruptive Events: An ISSI International Team Project – 266
- Sugama, T.**
Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55
- Sukhatme, Gaurav S**
Real-time Motion Tracking from a Mobile Robot – 185
- Sullivan, Gregory P.**
NASA Crew Launch Vehicle Flight Test Process – 30
- Sumegi, R. B.**
Dual Mode Power Unit Having a Combustor Bypass System – 14
- Sumption, Michael D**
Pinning Enhancement of YBa₂Cu₃O_{7-d} Thin Films with Y₂BaCuO₅ Nanoparticles – 94
- Sumrall, John P.**
A New Heavy-Lift Capability for Space Exploration: NASA's Ares V Cargo Launch Vehicle – 21
- Sun, Baosan**
Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257
- Sun, Yongmei**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Sundheim, Beth M**
Overview of Results of the MUC-6 Evaluation – 238
Overview of the Third Message Understanding Evaluation and Conference – 152
Plans for a Task-Oriented Evaluation of Natural Language Understanding Systems – 144
- Susca, Sara**
Monitoring Environmental Boundaries with a Robotic Sensor Network – 185
- Sussman, Gerald J**
Cellular Gate Technology – 116
- Suter, L. J.**
Hard x-ray Imaging and Spectroscopy of Long Pulse NIF Hohlräume – 203
Radiation-Driven Hydrodynamics of Long Pulse Hohlräume on the National Ignition Facility – 227
- Sutton, M.**
Canadian Led X-ray Polarimeter Mission CXP – 261

- Sutton, Michael A**
Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – 188
- Swartout, W**
Toward the Holodeck: Integrating Graphics, Sound, Character and Story – 175
- Swartout, William**
On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT – 176
- Swenson, D.**
Continuous Severe Plastic Deformation Processing of Aluminum Alloys. (Final Report, February 21, 2001-March 31, 2006) – 50
- Sycara, Katia**
An Examination of Remote Access Help Desk Cases – 160
- Syverson, Paul**
Distance Bounding Protocols: Authentication Logic Analysis and Collusion Attacks – 200
- Syverson, P**
Preventing Wormhole Attacks on Wireless Ad Hoc Networks: A Graph Theoretic Approach – 68
- Tachibana, Takuji**
Advanced Lightpath Establishment for Distributed Computing – 221
- Tadmor, Eitan**
Rotation Prevents Finite-Time Breakdown – 177
- Tague, Patrick**
A General Probabilistic Model for Improving Key Assignment in Wireless Networks – 67
- Tajima, Akio**
Secure Communication with Quantum Cryptography – 76
- Takeoka, Masahiro**
Manipulation and Measurement of Quantum Signals via Non-Gaussian Operation – 77
- Takesue, Hiroki**
Generation of Telecom-band Quantum Entangled Photon Pairs and its Application to Quantum Key Distribution – 76
- Tang, J. Y.**
Single Particle Beam Dynamics Design of BSNS/RCS – 205
- Tanguay, Jr , Armand R**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- Tawara, Yasuo**
Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Taylor, James L.**
Systems Integration Processes for NASA Ares I Crew Launch Vehicle – 22
- Taylor, Shawn**
An Update on Structural Seal Development at NASA GRC – 28
Overview of NASA Glenn Seal Project – 29
Test Rig for Active Turbine Blade Tip Clearance Control Concepts: An Update – 15
- Taylor, Terry L.**
Status, Plans, and Initial Results for ARES 1 Crew Launch Vehicle Aerodynamics – 20
- Terunuma, N.**
Performance of a Nanometer Resolution BPM System – 231
- Tetreault, Joel**
Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
- Than, R.**
Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207
- Tharion, William J**
Graphical User Interface (GUI) for the Warfighter Physiological Status Monitoring (WPSM) System - U.S. Army Medic Recommendations – 145
- Thiagarajan, P.**
Semiconductor Lasers with Hybrid Materials Systems – 217
- Thorneloe, S.**
Case Study Demonstrating U.S. EPA Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities, Somersworth Sanitary Landfill, Somersworth, New Hampshire – 106
- Tisnado, Diana M**
Quality of Breast Cancer Care: The Role of Hispanic Ethnicity, Language, and Socioeconomic Position – 131
- Toda, Hiroyuki**
Dense Multiplexing and Transmission Technique of Millimeter-Wave-Band Radio-on-Fiber Signals – 67
- Tofsted, David H**
High Resolution Electro-Optical Aerosol Phase Function Database PFN-DAT2006 – 115
- Tolk, Norman**
Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
- Tombari, C.**
Lessons Learned from the U.S. Photovoltaics Industry: Implications for Distributed Wind – 102
- Tomchesson, Joshua L**
Effects of Environmental Conditions on Activity, Feeding, and Body Weight in Male and Female Adolescent Rats – 119
- Tomisaka, K.**
Current Advances in the Computational Simulation of the Formation of Low-Mass Stars – 261
- Tomita, Akihisa**
Secure Communication with Quantum Cryptography – 76
- Tood, A. M.**
System and Method for Producing Terahertz Radiation – 201
- Toomey, Doug**
Searching for Planets with NICI – 253
- Top, P.**
Token Ring Protocol for Dynamic Ad-hoc Wireless Environments – 148
- Torkelson, J. M.**
Method of Producing Exfoliated Polymer-Clay Nanocomposite and Polymer-Clay Nanocomposite Produced Therefrom – 37
- Torrey, D. A.**
Commercialization of a 2.5kW Utility Interactive Inverter for Distributed Generation – 103
- Tove, Sherry R**
Structural Analysis and Bioengineering of Thermostable Pyrococcus Furiosus Prolidase for Optimization of Organophosphorus Nerve Agent Detoxification – 48
- Trani, Antonio**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Traum, David R**
Controlling the Focus of Perceptual Attention in Embodied Conversational Agents – 155
Evaluation of Multi-Party Reality Dialogue Interaction – 155
Evaluation of Transcription and Annotation Tools for a Multi-Modal, Multi-Party Dialogue Corpus – 156
Ideas on Multi-layer Dialogue Management for Multi-party, Multi-conversation, Multi-modal Communication (Extended Abstract of Invited Talk), – 69
- Traum, David**
Issues in Corpus Development for Multi-Party Multi-Modal Task-Oriented Dialogue – 70
The Error Is the Clue: Breakdown In Human-Machine Interaction – 163
- Trbojevic, D.**
Non-Scaling FFAG for Rare Isotopes Production – 209
- Treskunov, Anton**
Leveraging Hollywood Set Design Techniques to Enhance Ad Hoc Immersive Display Systems – 92

- Tressler, James F**
Thin, Lightweight, Low Frequency Acoustic Projectors for Shallow Water Environments – 80
- Trieu, Bo C.**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Trivelpiece, A. W.**
WTEC Panel Report on High-End Computing Research and Development in Japan – 150
- Trujillo, Chad**
Gemini's ALTAIR Adaptive Optics System – 249
Hokupa'a: Gemini's First AO System – 249
- Tsai, Yuan-Sen**
Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62
- Tsang, Hon Ki**
Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77
- Tsuchiya, Masahiro**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Tsuchiya, Mashiro**
Optical Amplification and Switches in Silicon Based Photonic Devices for Future Networks – 77
- Tsui, James B Y**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
Calibration of a Low Cost Clock Using Wide Area Augmentation System (WAAS) (Preprint) – 9
Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8
- Tsujino, Kenji**
Status of Development of Photon Number Resolving Detectors – 76
- Tsvetovat, Maksim**
DyNetML: Interchange Format for Rich Social Network Data – 246
- Tuma, Margaret L.**
NASA Crew Launch Vehicle Flight Test Process – 30
- Tuozzolo, J.**
Relativistic Heavy Ion Collider (RHIC) Refrigerator System at Brookhaven National Laboratory: Phase III of the System Performance and Operations Upgrades for 2006 – 207
- Turnquist, Norman**
Brush Seals for Improved Steam Turbine Performance – 24
- Tyburski, Timothy**
NASA's Exploration Architecture – 26
- Tygart, Mark**
A Randomized Algorithm for the Approximation of Matrices – 180
Fast Algorithms for the Solution of Eigenfunction Problems for One-Dimensional Self-Adjoint Linear Differential Operators – 179
- Ueta, Akio**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Ulbrich, Norbert**
A Comparison of Two Balance Calibration Model Building Methods – 189
- Urakawa, J.**
Performance of a Nanometer Resolution BPM System – 231
- Ushikubo, Takashi**
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219
- Utkin, Y.**
Flow and Noise Control in High Speed and High Reynolds Number Jets Using Plasma Actuators – 87
- Vachon, B.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Vakebte, Andre**
On the Role of Humans in Enterprise Control Systems: the Experience of INSPECT – 176
- Valavani, Lena**
An Interim Report of Research on Stochastic and Adaptive Systems – 191
- Valente, Andre**
The KOJAK Group Finder: Connecting the Dots via Integrated Knowledge-Based and Statistical Reasoning – 245
- van Buuren, T.**
FY05 LDRD Final Report Time-Resolved Dynamic Studies using Short Pulse X-Ray Radiation – 93
- Van de Putte, T. R.**
Effect of Quartz/Mullite Blend Ceramic Additive on Improving Resistance to Acid of Sodium Silicate-Activated Slag Cement – 55
- van Lent, Mike**
Branching Storylines in Virtual Reality Environments for Leadership Development – 155
- van Velsen, Martin**
Branching Storylines in Virtual Reality Environments for Leadership Development – 155
- Vanina, Bob**
Effect of Solventless Bore Cleaning Device (SBGD) on Surface Finish and Contamination Transport in the M256 Gun Barrel – 40
- Varanasi, Chakrapani**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Vashae, Daryoosh**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Vassberg, John C.**
Drag Prediction for the DLR-F6 Wing/Body and DPW Wing using CFL3D and OVERFLOW Overset Mesh – 91
- Vaughn, Andrew F**
Risk Factors for Community-Acquired Methicillin-Resistant Staphylococcus Aureus (CAMRSA) Infections in Military Trainees: Review of an Outbreak in San Diego, California, 2002 – 117
- Vay, J. L.**
Filling in the Roadmap for Self-Consistent Electron Cloud and Gas Modeling – 230
- Veran, Jean-Pierre**
Gemini's ALTAIR Adaptive Optics System – 249
Hokupa'a: Gemini's First AO System – 249
- Verma, S.**
Soot and Sulfuric Acid from Aircraft: Is There Enough to Cause Detrimental Environmental E-kCTSs? – 109
- Viken, Jeff**
Utilizing Traveler Demand Modeling to Predict Future Commercial Flight Schedules in the NAS – 7
- Vogel, V.**
Performance of a Nanometer Resolution BPM System – 231
- Vogt, R.**
Open and Hidden Charm Production at RHIC and LHC – 202
Proposal for a High Energy Nuclear Database – 209
- Voinov, A.**
Soft Radiative Strength in Warm Nuclei – 215
- von der Malsburg, Christoph**
Adaptive Optoelectronic Eyes: Hybrid Sensor/Processor Architectures – 84
- von Molnar, S.**
WTEC Panel Report on Spin Electronics – 75
- von Spakovsky, Michael R**
The Use of Exergy and Decomposition Techniques in the Development of Generic Analysis, and Optimization Methodologies Applicable to the Synthesis/Design of Aircraft/Aerospace Systems – 11
- Vutukury, Srinivas**
Multipath Routing Mechanisms for Traffic Engineering and Quality of Service in the Internet – 167
- Wada, Naoya**
Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219
OCDM Transmission Experiments on JGNII Test bed Optical Link – 219

- Research and Development of 160 Gbit/s/port Optical Packet Switch Prototype and Related Technologies – 220
- Wadcock, Alan J.**
Measurement of Vortex Strength and Core Diameter in the Wake of a Hovering Rotor – 4
- Wadkins, Randy M**
Temporal and Spatial Dynamics of DNA Topoisomerase 1 in Prostate Cancer – 132
- Wakana, Hiromitsu**
Journal of the National Institute of Information and Communications Technology. Special Issue on Photonic Networks; Volume 53, No. 2 – 218
- Waldinger, R J**
Reasoning About Programs – 153
- Walhood, D. G.**
Dual Mode Power Unit Having a Combustor Bypass System – 14
- Walker, H.**
Evaluation of Open Geospatial Consortium Standards for Use in LLNL Geographic Information Systems (GIS) – 235
- Walker, Richard L**
Cepheids in Multiple Systems: ADS 14859 – 256
- Walker, William F**
Constrained Adaptive Beamforming for Improved Contrast in Breast Ultrasound – 139
- Wall, R W**
Support Platform and Communications to Manage Cooperative AUV Operations – 68
- Walmsley, I. A.**
Generation and Characterization of Attosecond Pulses – 208
- Walther, Herbert**
Quantum Network Consisting of Laser-cooled Ions and Photons – 77
- Wan, J.**
Preparation of Nanocomposites of Alumina and Titania – 53
- Wan, Ningshan**
Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 256
- Wan, Xiaoliang**
An Adaptive Multi-Element Generalized Polynomial Chaos Method for Stochastic Differential Equations – 199
Long-Term Behavior of Polynomial Chaos in Stochastic Flow Simulations – 183
- Wang, Eugenia**
Generation of Advanced Diagnostics and Countermeasures for Individuals Most Vulnerable to Biothreats – 140
- Wang, Gou-Jen**
Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63
- Wang, Hailin**
Electromagnetically Induced Transparency in Semiconductors – 84
- Wang, Hui**
Dynamic Importance Sampling for Queueing Networks – 192
Importance Sampling for Sums of Random Variables With Regularly Varying Tails – 192
Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Convergence Analysis – 197
Subsolutions of an Isaacs Equation and Efficient Schemes for Importance Sampling: Examples and Numerics – 181
- Wang, Jiaji**
Membership and Spatial Motion of Young Open Cluster NGC 2244 – 259
- Wang, Jianqiang**
Comparing User-assisted and Automatic Query Translation – 243
Parsing and Tagging of Bilingual Dictionary – 242
- Wang, Jinqing**
The Analysis and Test of Phase Calibration – 260
- Wang, Limin**
Authentication in Reprogramming of Sensor Networks for Mote Class Adversaries – 161
- Wang, S.**
Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209
Single Particle Beam Dynamics Design of BSNS/RCS – 205
- Wang, Ten-See**
Observations of Shock Diffusion and Interactions in Supersonic Freestreams with Counterflowing Jets – 31
- Wang, Xu**
Emerging Techniques to Enable Asynchronous Coherent OCDMA – 219
- Wang, Yu**
A New Hybrid Channel Access Scheme for Ad Hoc Networks – 164
Broadcast Traffic in Ad Hoc Networks with Directional Antennas – 166
Channel Sharing of Competing Flows in Ad Hoc Networks – 165
Collision Avoidance in Single-Channel Ad Hoc Networks Using Directional Antennas – 165
Directional Collision Avoidance in Ad Hoc Networks – 85
Performance of Collision Avoidance Protocols in Single-Channel Ad Hoc Networks – 165
- Spatial Reuse and Collision Avoidance in Ad Hoc Networks with Directional Antennas – 166
- Ward, Nigel**
A Connectionist Treatment of Grammar for Generation: Relying on Emergents – 237
- Watkins, Anthony N.**
Testing of the Crew Exploration Vehicle in NASA Langley's Unitary Plan Wind Tunnel – 91
- Watts, D. M.**
Three-Dimensional Human Bronchial-Tracheal Epithelial Tissue-Like Assemblies (TLAs) as Hosts For Severe Acute Respiratory Syndrome (SARS)-CoV Infection – 116
- Weaver, J. H.**
Final Report: Nanoscale Cluster Assembly on Compliant Substrates: A New Route to Epitaxy and Nanosstructure Synthesis – 42
- Wei, J.**
China Spallation Neutron Source Accelerators: Design, Research, and Development – 207
Lattices for High-Power Proton Beam Acceleration and Secondary Beam Collection and Cooling – 209
Single Particle Beam Dynamics Design of BSNS/RCS – 205
- Wei, Wenren**
The Analysis and Test of Phase Calibration – 260
- Weinacht, Paul**
Another Analytical Approach to Predicting Munition Trajectories – 111
- Weinzapfel, C.**
System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222
- Weiss, Charles**
Electro-Osmotic Pulse Technology for Control of Water Seepage in Various Civil Works Structures – 46
- Weisskopf, M.**
Canadian Led X-ray Polarimeter Mission CXP – 261
- Welch, J. D.**
Economical and Very Simple to Fabricate Single Device Equivalent to CMOS, and Other Semiconductor Devices in Compensated Semiconductor – 72
- Wemhoff, A. P.**
Calibration of Parameters in Beta-Delta HMX Phase Transformation Kinetics Using Computer Simulations – 44
- Wen, Wen**
Luminosity Function and Segregation Effect of the Open Cluster NGC 6530 – 259
- Wendisch, Manfred**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114

- Werner, Jacob**
Closed-Loop Noninvasive Ultrasound Glucose Sensing and Insulin Delivery – 122
- Wessel, Vernon W.**
NASA Engineering Excellence: A Case Study on Strengthening an Engineering Organization – 23
- White, B E**
Tactical Data Links, Air Traffic Management, and Software Programmable Radios – 7
- White, J O**
Fundamental Research on Infrared Detection – 93
- White, Timothy L**
Tactile Displays and Detectability of Vibrotactile Patterns as Combat Assault Maneuvers are Being Performed – 146
- Whiting, Philip**
Refined Large Deviation Asymptotics for the Classical Occupancy Problem – 182
- Whitney, R**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 71
- Whitney, Richard**
Limited Domain Synthesis of Expressive Military Speech for Animated Characters – 70
- Widmayer, C.**
System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222
- Wilkins, Sr, David E**
A Common Knowledge Representation for Plan Generation and Reactive Execution – 151
- Williams, Anthony W**
Ablation Loss Studies for Capillary - Sustained Plasmas – 228
- Williams, Gary**
High-Speed Fiber Bragg Grating Interrogation System Development – 158
- Williams, L.**
Improving the Communication of Geographic Patterns of Disease through Computer-Based Tools – 146
- Williams, W.**
System for Measuring Defect Induced Beam Modulation on Inertial Confinement Fusion-Class Laser Optics – 222
- Willsky, A S**
Multiresolution Stochastic Models, Data Fusion, and Wavelet Transforms – 194
Multiscale Riccati Equations and a Two-Sweep Algorithm for the Optimal Fusion of Multiresolution Data – 187
Using Natural Wavelet Bases and Multiscale Stochastic Models for Tomographic Reconstruction – 195
- Willsky, Alan S**
Examination of Wavelet Packet Signal Sets for Over-Saturated Multiple Access Communications – 67
Likelihood Calculation for a Class of Multiscale Stochastic Models, with Application to Texture Discrimination – 194
Modeling and Estimation of Multiresolution Stochastic Processes – 193
Multiscale Object Recognition and Feature Extraction Using Wavelet Networks – 176
Multiscale Smoothing Error Models – 194
- Wilson, D K**
Quasi-Wavelet Models of Turbulent Temperature Fluctuations Boundary-Layer Meteorology – 111
- Wilson, T. S.**
Shape Memory Polymer Therapeutic Devices for Stroke – 54
- Witsell, Theo**
A Regional Guidebook for Conducting Functional Assessments of Wetland and Riparian Forests in the Ouachita Mountains and Crowley's Ridge Regions of Arkansas – 100
- Wodnicki, R. G.**
Optimized Switching Configurations for Reconfigurable Arrays of Sensor Elements – 75
- WojciechVoytek, Sak**
Advanced Thermal HPT Clearance Control – 15
- Wolak, J.**
Internet Sex Crimes Against Minors: The Response of Law Enforcement – 66
Online Victimization: A Report on the Nation's Youth – 147
Online Victimization of Youth: Five Years Later – 147
- Woldegiorgis, A.**
Results from the Swedish National Screening 2005. Subreport 2. Biocides – 44
Results from the Swedish National Screening Programme 2005. Subreport 3. Perfluorinated Alkylated Substances (PFAS) – 45
- Wong, S C**
Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183
- Wong-Ng, Winnie**
Addition of Alternate Phase Nanoparticle Dispersions to Enhance Flux Pinning of Y-Ba-Cu-O Thin Films – 45
- Wophlgemuth, J.**
Large-Scale PV Module Manufacturing Using Ultra-Thin Polycrystalline Silicon Solar Cells. (Final Report, April 1, 2002-February 28, 2006) – 101
- Wornell, Gregory W**
Efficient Symbol-Spreading Strategies for Wireless Communication – 70
- Worsham, Maria J**
Population Based Assessment of MHC Class 1 Antigens Down Regulation as Marker in Increased Risk for Development and Progression of Breast Cancer From Benign Breast Lesions – 137
- Wrbanek, John D.**
Thin Film Ceramic Strain Sensor Development for Harsh Environments: Interim Report on Identification of Candidate Thin Film Ceramics to Test for Viability for Static Strain Sensor Development – 13
- Wright, Ernie**
Cryogenic Test Capability at Marshall Space Flight Center's X-ray Cryogenic Test Facility – 59
- Wu, Shen-Chun**
Typical Flow between Enclosed Corotating Disks and its Dependence on Reynolds Number – 62
- Wu, X.**
Annual Report to the Nation on the Status of Cancer, 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Commentary – 235
- Xi, Wang**
Experimental Study of a Burst-Switched WDM Network Testbed – 221
- Xiao, H**
Solid Oxide Fuel Cell Based Upon Colloidal Deposition of Thin Films for Lower Temperature Operation (Preprint) – 103
- Xu, Huizuo**
GPS Radio Occultation Data Processing System – 258
- Xu, Ren**
Chromatin Regulation of the EGFR Locus in Human Mammary Epithelial Cells – 121
- Xu, Surgang**
Advanced Lightpath Establishment for Distributed Computing – 221
- Xu, Ying**
Interface Sensitive Study of Spin Injection, Transport and Relaxation in Ferromagnet-Semiconductor Quantum Well Systems for Spin Applications – 84
- Xu, Zhengfu**
Anti-Diffusive Finite Difference WENO Methods for Shallow Water with Transport of Pollutant – 182
- Yagi, Takeshi**
Experiments of a Terabit-Class Super-Network – 220
- Yamamoto, Naokatsu**
Fabrication Technique of Ultra-high Density Semiconductor Quantum Dot – 78
- Yan, J.**
Development of BPM Electronics at the JLAB FEL – 232

- Yan, Jerry C.**
Constructing Space-Time Views from Fixed Size Statistical Data: Getting the Best of both Worlds – 168
- Yang, Fumin**
Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257
- Yang, Hao**
A Report on Getter Pump for Hydrogen Maser – 257
- Yang, Ping**
Impact of Cirrus Crystal Shape on Solar Spectral Irradiance: A Case Study for Subtropical Cirrus – 114
- Yang, Sheng-An**
Thermodynamic Analysis of Free Convection Film Condensation on an Elliptical Cylinder – 61
- Yang, Y. M.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Yang, Yan**
Software Realization Method of Extracting VLBI Phase Calibration Signal – 259
- Yang, Zeng-Quan**
Characterization of Novel Genes Within 8p11-12 Amplicon in Breast Cancer – 136
- Yang, Zhigen**
Relative Deformation Rates between Co-located VLBI Stations and its Comparison with VTRF2005 – 257
- Yelick, K.**
WTEC Panel Report on High-End Computing Research and Development in Japan – 150
- Yemini, Y.**
Methods and Systems for Autonomously Managing a Network – 149
- Yin, Yan**
Research on the Sampling Offset about Satellite Navigation Receiver – 258
- Yoshida, Setsuo**
Compact Photonic Gateway with AOTF for Remotely Controlling lambda-Paths – 222
- Young, A J**
Prevention of Cold Injuries During Exercise – 142
- Young, Roy M.**
Mercury Sample Return using Solar Sails – 264
Recent Advances in Solar Sail Propulsion at NASA – 33
- Young, Stephen K**
Integration with Respect to Operator-Valued Measures with Applications to Quantum Estimation Theory – 233
- Yu, Jirong**
Advanced 2-micron Solid-state Laser for Wind and CO2 Lidar Applications – 94
- Yu, Nanhua**
Ocean Tide Models Performance in Coastal Regions – 116
- Yu, Paul Kit Lai Yu**
Novel Photonic Devices Based on Electro-optic Modulation Technologies – 78
- Yu, Wen-Chun**
Discrete Sliding Mode Controller Design Based on the LQR Suboptimal Approach with Application on AC Servo Motor – 63
- Yu, Y. H.**
Material Flow Analysis of Cadmium Applied to Review MSW Treatment in Taiwan – 64
- Yuan, P.**
Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110
- Zatar, W. A.**
Seismic Evaluation of the Cumberland River Bridges Along I-24 in Western Kentucky – 96
- Zatar, W.**
Seismic Evaluation and Ranking of Bridge Embankments Along I-24 in Western Kentucky – 110
- Zeng, Gehong**
Thermoreflectance Imaging of Superlattice Micro Refrigerators – 78
- Zhang, Haifeng**
The New SLR Ephemeris and its Application to Predicting Satellites – 258
- Zhang, Hongping**
Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – 259
- Zhang, Jian**
Learning-Based Anomaly Detection in BGP Updates – 159
- Zhang, Jim X**
Explicit Solutions for a Class of Nonlinear PDE that Arise in Allocation Problems – 181
Refined Large Deviation Asymptotics for the Classical Occupancy Problem – 182
- Zhang, Mengping**
Explicit Construction of Entropy Solutions for the Lighthill-Whitham-Richards Traffic Flow Model with a Non-Smooth Flow-Density Relationship – 183
- Zhang, P.**
Fiber Optical Micro-Detectors for Oxygen Sensing in Power Plants. Quarterly Technical Report for April 1, 2006 to June 30, 2006 – 72
- Zhang, S. Y.**
Experience in Reducing Electron Cloud and Dynamic Pressure Rise in Warm and Cold Regions in RHIC – 208
- Zhang, Xiaoliu**
A Potent Oncolytic Herpes Simplex Virus for the Therapy of Advanced Prostate – 130
- Zhang, Xiuzhong**
Research on the Sampling Offset about Satellite Navigation Receiver – 258
- Zhang, Zhongping**
Screen Processing for Satellite Laser Ranging at High Repetition Rate – 257
The New SLR Ephemeris and its Application to Predicting Satellites – 258
- Zhao, Dawen**
Therapeutic Vascular Targeting and Irradiation: Correlation of MRI Tissue Changes at Cellular and Molecular Levels to Optimizing Outcome – 139
- Zhao, Junliang**
Luminosity Function and Segregation Effect of the Open Cluster NGC 6530 – 259
- Zhao, Junling**
Determining the Distance of Open Cluster M11 from the Pure Kinematical Observational Data – 257
- Zhao, T.**
Seismic Evaluation of the Tennessee River Bridges Along I-24 in Western Kentucky – 97
- Zheng, Weimin**
Annals of Shanghai Astronomical Observatory, Academia Sinica, Volume 27 – 256
Software Realization Method of Extracting VLBI Phase Calibration Signal – 259
- Zheng, Yefeng**
Machine Printed Text and Handwriting Identification in Noisy Document Images – 243
- Zhou, Jie**
Architecture-Based Refinements for Secure Computer Systems Design – 164
- Zhou, Jing**
A Sublinear Algorithm of Sparse Fourier Transform for Nonequispaced Data – 200
- Zhou, Qihou**
Assessment and Handling of CA Code Self-Interference During Weak GPS Signal Acquisition (Preprint) – 8
Interference Cancellation Using Power Minimization and Self-Coherence Properties of GPS Signals (Preprint) – 8
- Zhu, Dongming**
Effects of Doping on Thermal Conductivity of Pyrochlore Oxides for Advanced Thermal Barrier Coatings – 39
- Zhu, Timothy C**
Real-Time Dosimetry and Optimization of Prostate Photodynamic Therapy – 134

Zhu, Wenyao

Monitoring the Ionospheric TEC Variations Over Yangtze Delta Region – [259](#)

Zimmerman, M

The ICSI+ Multilingual Sentence Segmentation System – [197](#)

Zimmerman, William

Analytical Study of Sub Terahertz Radiation from Ultrashort Laser Pulse Propagation Streamers – [210](#)

Ziock, K. P.

Report on the Performance of a Large-Area, Gamma-Ray Imager for Search – [214](#)

Zohner, Justin J

An Alternative Method of Evaluating 1540NM Exposure Laser Damage using an Optical Tissue Phantom – [94](#)

Zuckewar, Allan J.

Phase Calibration of Microphones by Measurement in the Free-field – [211](#)

Zue, Victor

The MIT Summit Speech Recognition System: A Progress Report – [195](#)

Zuo, Jianzheng

Computational and Experimental Studies to Demonstrate Accuracy of Crack3D. Delivery Order 0001: Stable Tearing Predictions Using Large Deformation Kinematics and General 3D Crack Growth Algorithms Under Mixed Mode Loading Conditions – [188](#)